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LIPPINCOTT'S
NURSING MANUALS

CARE AND FEEDING OF INFANTS AND CHILDREN

A TEXT-BOOK FOR TRAINED NURSES

BY

WALTER REEVE RAMSEY, M.D.

Associate Professor of Diseases of Children, University of Minnesota, Associate Visiting Physician to the University Hospital, Visiting Physician to St. Paul City and County Hospital, Medical Director St. Paul Baby Welfare Association, Etc.

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To nurse a sick baby back to health frequently takes weeks or months of gentle, patient, intelligent handling. *Page 4.*

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INCLUDING SUGGESTIONS ON NURSING

BY

MARGARET B. LETTICE

SUPERVISING NURSE OF THE BABY WELFARE ASSOCIATION, ST. PAUL, MINNESOTA

123 ILLUSTRATIONS

SECOND EDITION REVISED

PHILADELPHIA AND LONDON
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PREFACE TO THE SECOND EDITION

In the second edition of "Care and Feeding of Infants and Children," I have made whatever changes are necessary to bring the book up to date. The entire first chapter has been rewritten and practically all have been modified to some extent.

It was a great satisfaction to observe that the majority of American and British nurses doing child welfare work in France and Belgium during the war were equipped with this book. I trust the second edition will supply most of the shortcomings of the first.

Walter R. Ramsey.

St. Paul.

PREFACE

In writing a text-book for nurses, on the care and feeding of infants and children, I have tried to make it practical and at the same time sufficiently comprehensive to meet the increasing demand for a broader education along the line of preventive medicine.

The anatomy and physiology have been considered only in so far as they relate directly to the subject of child welfare.

The chapters on feeding are the result not only of a large personal experience but also of a study of the work of the leading pediatrists, both in this country and in Europe.

Although the discussion of the pathological conditions common to infants and children has of necessity to be brief, in a work of this kind, I have endeavored to give the nurse the sort of information most useful to her, and of the greatest benefit to the public.

I am greatly indebted to Dr. Josephine Heminway Kenyon, of the Teacher's College of Columbia University, and to Miss Ida M. Cannon, Chief of the Department of Social Service, Massachusetts General Hospital, Boston, for many valuable suggestions made by them in reviewing the manuscript.

I wish also to express my appreciation to Dr. Wilson G. Smillie, of the Department of Hygiene, Harvard Medical School, for several important points in the chapter on milk, and to Dr. Bronson Crothers, who helped me to revise the manuscript.

Walter R. Ramsey.

St. Paul, May 1, 1916.

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The Care and Feeding of Infants and Children

CHAPTER I

CHILD WELFARE

The attitude of the community towards the child has changed radically during the past few years. Many of the traditions and superstitions which have dominated in matters relating to the care of the child have been swept away and practical measures, resting to a large extent upon a solid scientific basis, are beginning to prevail. The child is at last coming into his own and is now rightfully regarded as the foundation upon which the nation rests.

It is now recognized that the birth and proper development of the child follows the same natural laws as that of other animals. If the parents are normal and live under normal conditions, the child will be normal at birth (barring accidents) and will remain so, as long as proper conditions surround it.

The conditions under which a large part of the population live and work are not normal to-day, however. When the masses of the people lived on the farms and in small hamlets and the women worked in their homes and nursed their babies, the mortality among the children was small. With the development of the industrial centres, where a large per cent. of the women and girls worked in factories, the situation assumed a different aspect. The general health of the women and children deteriorated and the mortality among infants rose rapidly. This was well illustrated in France during the

war, where infant mortality during the first year reached as high as 50 per cent. in some of the manufacturing cities, while in the rural districts, where the mothers worked in their homes or in the fields and nursed their babies, but otherwise gave them almost as indifferent care as in the cities, the mortality was hardly above 85 per thousand births.

Since the community has come to a realization that the child of to-day is the citizen of to-morrow, it must also realize the necessity of producing normal children and of keeping them normal until they become normal citizens who are capable of taking their full share in the responsibilities of the community and the nation.

In how far we have fallen short in this matter was well illustrated by the recent draft, when 30 per cent. of our young men between the ages of twenty-one and thirty-one were rejected for physical disabilities. The majority of these disabilities resulted from affections contracted during childhood, practically all of which were preventable.

It is now a well recognized fact that a large part of all the ills from which children suffer are due to ignorance on the part of those who have them in charge, of the simple fundamental rules of hygiene.

Since ignorance is the cause, education must be the remedy. The future well-being, then, of the child depends to a large extent upon the proper education of the public, especially the mother, in the care of herself and her children.

How can this be done most effectively? There are many channels through which the public may be educated. For a long time the family physician was the sole authority on questions of health. That the physician should be an authority on public health, and particularly on questions pertaining to the welfare of mothers and children, goes without saying. But by this channel only a small part of the public, even under the most favorable conditions, is reached, since the doctor is usually consulted only when illness is already present.

With the trained nurse the situation is essentially the same. She comes into the home only during illness.

Another means of educating the public is through proper literature and the daily press; and to-day this is increasingly effective with the educated part of the population.

Many of the ills from which children suffer do not require a doctor nor a nurse in the old sense, since they result from a lack of knowledge on the part of the mother or other members of the family regarding the character and preparation of the food, clothing, housing, ventilation, etc. Education along these lines can best be carried on by the trained public health nurse and the trained social worker through demonstrations in the home. To women of proper character, temperament, and training, child welfare offers a field of greater fundamental service to humanity than almost any other.

The field of child welfare extends over a period beginning at conception and ending at complete adolescence. This period may be subdivided into:

1. Prenatal.
2. Natal.
3. Postnatal (from birth to two years).
4. Pre-school age.
5. School age.

This field is so vast it will be necessary in many cases for the nurse to limit herself to some phase of the work. She should, however, have a thorough grasp of the whole subject. To this end she should devote at least six months to special study.

The Prenatal Nurse

The fate of the unborn child is so intimately bound up with that of the mother that any influence which affects her well-being will, to a large extent, also affect that of the fœtus. This interdependence does not end at the birth of the child, but continues during the lactation period.

It is, therefore, imperative that the health of the prospec-

tive mother should be maintained at as high a point as possible throughout her pregnancy and the lactation period. Much of this responsibility will rest upon the nurse.

It is to be hoped that in the near future all pregnancies, including those occurring in the unmarried woman, will be reported to a central bureau at as early a period as possible. That an occurrence so important to the individual and the state should necessitate or even suggest secrecy, is one of the backward phases of our civilization.

At the earliest possible moment the pregnant woman should be visited by a nurse capable of making an estimate of the social and general health situation of the home. The character of the surroundings, the amount of sunlight, the ventilation, the toilets and sewerage, the source of water supply, all should be carefully noted on a blank prepared for the purpose.

The general nutrition of the prospective mother, of the children, and the father should be considered. The history of illnesses, previous pregnancies, particularly that of miscarriages, a repetition of which strongly points to syphilis, should not be overlooked. No woman should be permitted to bring syphilitic children into the world in the future since an early diagnosis and proper treatment will usually prevent this. The state is beginning to realize its responsibility in this matter, requiring registration, making Wassermann reactions without charge in all suspected cases and, if necessary, also supplying treatment.

The character of the occupation should be determined, and if outside of the home, in a factory, for example, the conditions under which the woman works should be ascertained by personal observation.

The pregnant woman should be induced to visit the prenatal clinic or her own physician for a physical examination at the earliest possible moment. She should take with her a fresh specimen of urine, passed in a clean chamber after first cleansing the external genitals with warm water, preferably by irrigation, to obviate the contamination of the urine from

this source. The urine should be transferred at once to a thoroughly cleaned bottle and kept cold until examined. The urine should be examined at least once monthly. The nurse should be present and assist the physician in the physical examination and note his findings for future guidance of the patient.

The breasts should be carefully examined, and if the nipples are undeveloped or inverted they should be corrected by proper manipulation.

The nurse should visit the prospective mother in her home regularly.

Vomiting of Pregnancy.—The vomiting of pregnancy is a very frequent condition during the early months and if persisted results in a great depletion of the nutrition of mother and fœtus. For the simple vomiting much can be done by rest and proper diet. No case should be allowed to go without proper medical supervision where the vomiting is persistent, as surgical interference is frequently necessary.

The diet of the pregnant woman should be plain, and sufficient amounts of coarse food, such as vegetables, fruit, whole wheat bread, etc., should be eaten to keep the bowels regular and free, without the aid of cathartics.

A proper amount of daily exercise in the open air, even to the termination of pregnancy, is indispensable to the health of the mother and the fœtus.

A period of rest in the recumbent position for an hour or so during the middle of the day should be enforced.

Varicose veins in the legs may require the proper application of flannel bandages or properly constructed elastic stockings.

The mental attitude of the prospective mother is of great importance. To this end proper literature should be furnished, and she should be encouraged to mingle with her friends and visit proper plays, but not those which are sensational or emotional in character. What there is, if anything, in maternal impressions remains to be determined.

The Obstetrical Nurse

It is not sufficient for the obstetrical nurse to know only the technic of preparing dressings, assisting the physician at the confinement, and the subsequent care of the mother. She should also be well informed in the care of the new-born baby. The future welfare of the infant rests in her hands to a large extent.

She should be thoroughly convinced of the necessity of breast feeding and well informed in its technic. The recent demonstration in the breast-feeding clinic at the University of Minnesota under the direction of Doctor Sedgwick should be studied with care, a reference to which will be found in the chapter on breast feeding.

The Child Welfare Nurse

The child welfare nurse occupies herself with assisting the physician at the clinics, takes the temperature, weighs the children, and after the physician's examination follows them to their homes and sees that the physician's orders are carried out. She shows the mother the technic of breast feeding, how to prepare the food, notes the character of the surroundings and the health of the other children, and in case she finds any under-nourished or suffering from some suspected malady, such as rickets, takes them to the clinic or sends them to their own physician for examination and advice.

Such a nurse has a great opportunity and a great responsibility. Her advice must be sound, as she will be met with tradition which, although it may be false, will be hard to supplant. It will not be sufficient to say that a thing is wrong; logical reasons must be advanced which appeal to the common sense of the people, for only in this way can real progress be made.

In many families the nurse will meet social conditions which are responsible for the bad hygiene and ill health of the

family. She must at least be able to recognize these conditions, and if her time and lack of training will not permit her to correct them, she should call in the trained social worker who will handle this delicate but indispensable part of the health problem.

There is a large group of children between the ages of three and six years who have little or no medical supervision. During this pre-school period children require supervision quite as much as at any other time. Many of the defects from which children suffer when they reach school age could have been prevented if they had had proper medical supervision.

For this reason child welfare clinics should include children from birth to the school age. School children should preferably attend a separate clinic from that for infants. It is important, however, that the clinics for children of different ages should be held in the same locality and the same nurses attend them all, as all the children in the same family should be seen by the same nurse. To this end the child welfare work should be divided into districts, each nurse having her own territory. The moral effect of having several nurses going into the same home is bad and should be avoided whenever possible.

The School Nurse

The work of the school nurse is much the same as that of the child welfare nurse, but at present more circumscribed. The time will soon come when the school nurse will follow those children who are found to be improperly fed and undernourished to their homes, thereby attacking the malady at its source. In the future we must rely upon education of the masses along public health lines, and education in public health must be made an essential part of the school curriculum. When all the mothers and fathers understand the fundamentals of hygiene the work of the public health officials will be much curtailed.

The Child Nurse

A nurse to be successful in the care of children must have special qualifications. She must have a sanguine temperament and be possessed of endless patience. To nurse a sick baby back to health frequently takes weeks or months of gentle, patient, intelligent handling. In caring for a sick infant the nurse must realize that she is dealing with an individual which is absolutely helpless. A baby is not a miniature adult as was formerly supposed, but has a physiology of its own. It is entirely helpless for the first years and utterly dependent upon those who have it in charge. Its mentality, however, develops rapidly, the moulding of which requires judgment of the finest order.

It is not necessary to spoil a child because it is ill, so that tenderness must be qualified by firmness. It is necessary that a nurse have absolute confidence in her ability to control her patient.

Since young children cannot talk, it is imperative that the nurse observe all symptoms carefully and learn to interpret their significance.

It must be remembered that there are certain expressions and movements which are characteristic of the normal infant. These must be carefully studied, as it is necessary to know the normal to be able to appreciate the abnormal. The character and expression of the eyes are of the greatest importance in determining whether a child is sick or well. In health there is an intelligent response when the baby is spoken to, or when bright objects are placed where they may be seen.

Any lack of uniformity of movements of the corresponding muscles on the two sides should be carefully noted.

The appearance and feeling of the normal skin is in great contrast to the dry, pale, non-elastic skin in simple atrophy, the hot, dry skin during a fever, or the cold, clammy skin during collapse.

The normal appearance of the tongue, lips, and mucous

membrane of the mouth should be carefully observed, so that any departure from the normal, in the way of dryness or coating, may be recognized promptly.

The cry of infants is an interesting and profitable study. There is no doubt that there are certain cries which are called forth by certain definite conditions. For example, the sharp cry which occurs in meningitis may be said to be fairly characteristic, as is the loud, piercing cry, which accompanies severe pain, as when the baby has acute indigestion or its skin is pierced by a safety-pin.

On the other hand, infants cry loudly and continuously and at about the same tempo when they have colic, when they are hungry, or when they are spoiled. It is, therefore, not safe to base one's diagnosis on the cry alone without a careful analysis of all symptoms. The diagnosis of hunger is too often made because the baby cries and sticks its finger in its mouth, when in reality it is already overfed or wishes to be rocked or carried about.

In the care of older children, particularly during convalescence, the question of keeping them occupied and happy is of great importance. An intelligent, resourceful nurse should aim not simply to amuse a child, but to have him intelligently occupied. Reading aloud from books carefully selected with reference to the condition and temperament of the individual case is a pleasant and profitable way of spending part of each day. Kindergarten activities, such as cutting out pictures, pasting, sewing, drawing, or painting are quiet occupations of great interest to the average child. There are in every public library suggestive books on child nature, kindergarten methods, and pastimes which would be stimulating and helpful to the ambitious nurse who wishes the best possible equipment for her work.

CHAPTER II

ANATOMY AND PHYSIOLOGY

The body of the infant at birth has the same general structure, and contains essentially the same organs, as that of the older child or adult. There are, however, some differences, both in the anatomy and physiology, which should be carefully noted.

The Skeleton

The skeleton or bony framework of the new-born is made up largely of cartilage, which in comparison with bone is soft and pliable and is very liable to deformities and fractures, especially of the greenstick variety. Later, as the child reaches the age of adolescence, the cartilage, by the multiplication of the bone cells and the deposition of lime salts, is transformed into bone.

Epiphyses.—The long bones develop (in length) from centres called *epiphyses* which are easily separated from the shaft. Injury to the epiphyses may result in shortening of the bone, from lack of development.

The different bones are held in apposition by fibrous ligaments which in some cases hold the opposing bones rather firmly together, while in others they act as hinges, allowing great freedom of motion, some in all directions, as in the case of the shoulder-joint, while in others—the knee-joint, for example—there is freedom only in anteroposterior movements.

THE SKULL

Sutures.—The bones of the skull in infants are so loosely held together that there is frequently considerable overriding of the opposing edges—so much so that at birth there may be a

marked change in the shape of the head.[1] The spaces separating the opposing edges of the bones in the skull are called sutures (Fig. 1). These gradually disappear, the two bones becoming essentially one by means of ossification at about the eighteenth to twentieth month.

FONTANELLES.—The large four-sided opening at the junction of the two frontal and two parietal bones is called the anterior, or

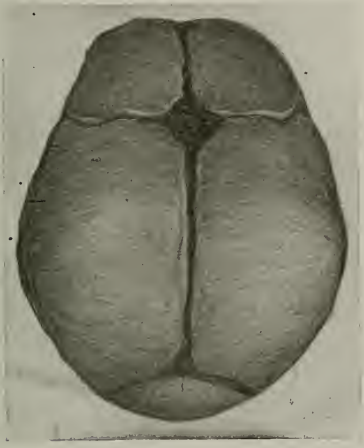

FIG. 1.—Sutures and fontanelles.

large fontanelle, and the smaller triangular opening at the junction of the occipital and parietal bones is known as the posterior, or small, fontanelle (Fig. 1). The small fontanelle closes nor-

[1] An œdematous condition of the scalp, due to pressure during birth, is known as *caput succedaneum*. It disappears by absorption in a few days. Hæmatomas or blood tumors under the scalp, due to injury from forceps, are common. They should be left alone and never opened, as serious infection may result. They disappear by absorption in a week or ten days (Fig. 2).

mally within the first year, while the large fontanelle closes normally from the fifteenth to the twentieth month. When it remains open beyond the second year it indicates the presence of rickets or some other abnormal condition.

Progressive widening of the fontanelles and sutures usually indicates the presence of hydrocephalus.

The Jaws.—The jaws of the young infant as compared with those of the older child or adult are markedly undeveloped. These differences, together with the character of the sutures and fontanelles, are well illustrated by the accompanying drawings. The teeth, although in the jaws at birth, are undeveloped. It is this later development which constitutes the essential difference in appearance between the jaws of the infant and those of the adult (Figs. 3 and 4).

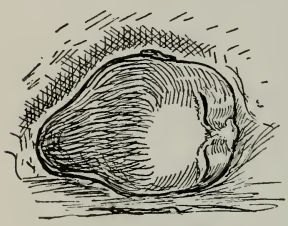

Fig. 2.—Cephalhæmatoma.

Sinuses.—"The maxillary sinus or antrum of Highmore and the mastoid antrum are the only cavities which exist at birth. They are both small, and increase much in size as the child grows older. The mastoid antrum in relation to the size and age of the child is relatively large. The frontal, ethmoidal, and sphenoidal sinuses appear about the seventh year, but it is not until puberty that they really begin to develop. The mastoid cells also appear at puberty and increase with age."

THE THORAX

Character and Shape.—The thorax, which contains the lungs, heart and the accompanying great vessels, differs chiefly from that of the adult in its shape and in the soft character of the bones which form its walls. The shape of the infant's chest is relatively narrower at the top than in the adult and wider at the bottom, having something the shape of a cone with its apex at the base of the neck (Figs. 5 and 6). The anteroposterior and

transverse diameters are nearly equal in the infant, while in the adult the transverse is greater by about one-quarter. The bones of the chest wall are made up largely of cartilage and are con-

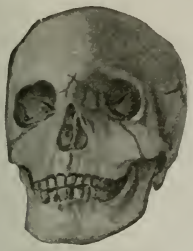

FIG. 3.—Skull of adult.

FIG. 4.—Skull of infant.

sequently very prone to changes in shape. Since the act of breathing is dependent upon the action of the muscles in elevat-

FIG. 5.—Chest of adult.

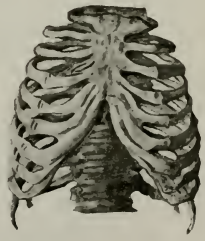

FIG. 6.—Chest of infant.

ing and lowering the ribs, together with action of the diaphragm, any deformity of the bones of the thorax is a serious menace to health. Such deformity may result from rickets, interference

Fig. 7.—Spinal column showing natural curves.

in breathing through the nose, enforced positions which the infant is not able itself to maintain, as well as by diseases of the thoracic organs themselves.

THE SPINAL CORD

The spinal column is made up of thirty-three segments, called vertebræ (Fig. 7). In the infant these segments consist largely of cartilage placed one upon the other and separated by connective tissue. The different vertebræ are held together by ligaments which allow a large range of flexibility in all directions. The vertebral column is divided anatomically into five parts, namely: (1) Seven cervical; (2) twelve dorsal; (3) five lumbar; (4) five sacral; (5) four coccygeal.

The *cervical vertebræ* are those of the neck, the first one articulating with the base of the skull and usually called the atlas.

The *dorsal vertebræ* represent the thoracic portion to which the ribs are attached.

The *lumbar vertebræ* represent the abdominal portion.

The *sacral,* which in the adult become ossified, leaving no separation between the individual vertebræ, form the posterior portion of the pelvis.

The *coccygeal* are the most rudimentary parts of the vertebral column and represent what in the animal is the tail. Occasionally the last *segment* of the coccyx becomes loosened and, owing to the pressure of sitting upon it, an inflammation is set up which is extremely painful, sometimes necessitating surgical interference.

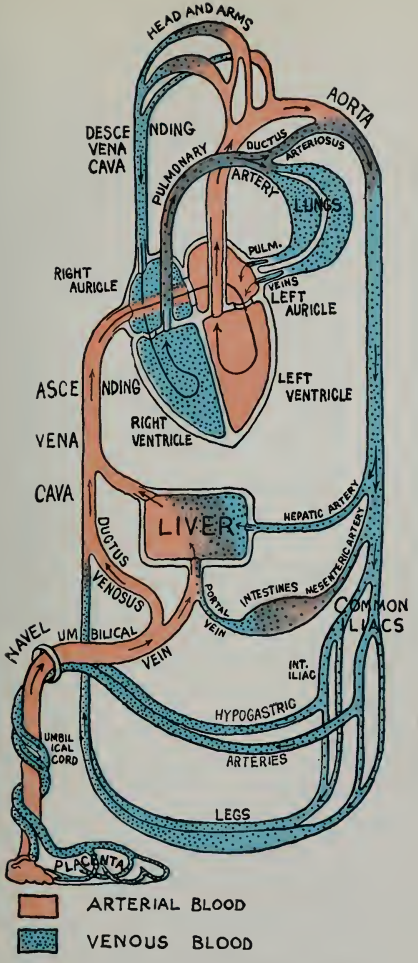

FIG. 8.—Diagram of infant's circulation before birth.

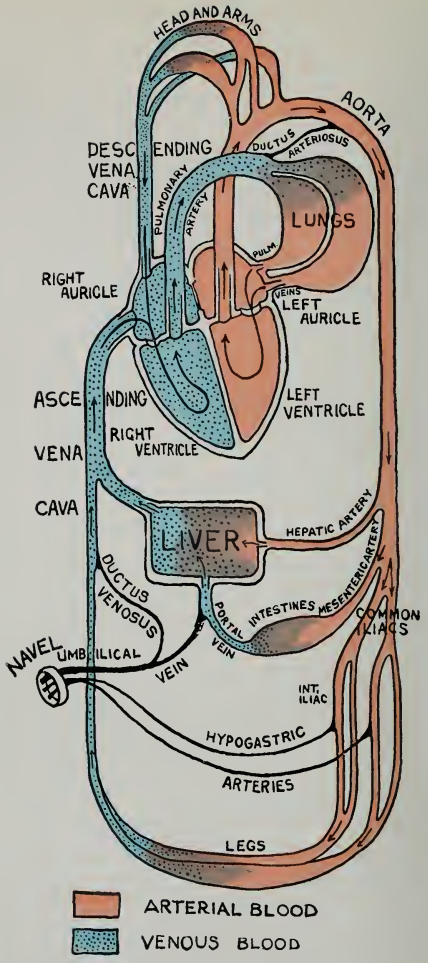

FIG. 9.—Diagram of infant's circulation after birth.

THE SPINAL CANAL

The canal extends throughout the spinal column to the end of the sacral vertebræ. The spinal cord, which is contained in the canal, and which serves to protect it from injury, does not extend beyond the lumbar vertebræ and there terminates in a bundle of nerves known as the cauda equina.

FORAMINA.—Between the vertebræ, throughout the length of the spinal column, are lateral openings called foramina, which transmit the nerve branches to and from the spinal cord. The spinal column in the young child is soft and poorly supported by muscles, so that the natural curves are liable to be exaggerated, producing deformities. An acute bending of the spine posteriorly is called kyphosis, an exaggerated bending forward, lordosis, and a lateral curvature, scoliosis.

DEFORMITIES FROM RICKETS AND TUBERCULOSIS.—These deformities may result either from malpositions or from diseases such as rickets and tuberculous involvement of the bodies of the vertebræ.

THE HEART AND CIRCULATION OF THE BLOOD

In the fœtus the heart begins to beat and send blood through the body as early as the second month.

Before birth the blood must pass through the cord to the placenta of the mother, where it gives up its carbon dioxide and other waste matter, becomes oxygenated, returning through the umbilical veins to be distributed by the heart throughout the body. The circulatory systems of the mother and fœtus are quite distinct, the blood of one coming into contact with that of the other only through the vessel walls of the placenta.

At birth, as soon as the cord has been tied, the blood, instead of being diverted to the placenta, must all pass through the lungs to receive oxygen. It is, therefore, necessary that the foramen ovale, as well as the *ductus arteriosus* and *ductus venosus*, should close permanently (Figs. 8 and 9). When one of these openings

remains patent, as occurs in a small percentage of cases, oxygenation is interfered with. Such cases usually succumb in infancy or early childhood. The one form of congenital heart which results in what is known as a "blue baby" may be due to obstruction in the *pulmonary valve,* or to some constriction in the *pulmonary artery.* The blue (cyanotic) condition of the skin and mucous membranes is due to improper oxygenation of the blood.

Position of the Heart.—The heart occupies much the same position as in the adult. It is, however, somewhat higher and more horizontal and further to the left. In the first four years the apex beat is usually palpable slightly to the left of the nipple line, from the fourth to the twelfth year, in the nipple line, and after the thirteenth year it is usually well within the nipple line.

The Apex Beat.—During the first year the apex impulse may usually be felt in the fourth intercostal space. After the second year it may be found either in the fourth or fifth interspace, and after the seventh or eighth year it is normally in the fifth intercostal space. Any deformity of the chest wall, however, will change their relative positions.

Frequency of the Heart Beat.—At birth the heart beats from one hundred and twenty to one hundred and thirty times a minute.

This gradually diminishes as the child grows older, until the age of adolescence, after which the average rate under normal conditions remains about the same throughout life.

Variation Under Normal Conditions.—Great variation occurs in the rate of the heart, depending upon mental and bodily activity. If the child is crying or nervous, the pulse is usually very rapid, and it is also markedly increased in frequency following a meal. Care, therefore, should be taken to obtain the pulse rate when the child is quiet, or, better, when asleep. During sleep the pulse is often irregular.

According to numerous observers, the pulse rate during sleep for different ages is as follows:

Six to twelve months	105–120
Two to six years	90–110
Seven to ten years	80– 90
Eleven to fourteen years	72– 85

Irregularity.—Irregularity of the pulse rate is frequent in children, but has no particular significance during health. It may, however, have grave significance during the course of such diseases as diphtheria. The taking of the pulse in children is rarely accurately done.

Manner of Taking the Pulse.—Unless a child is very docile, it is usually impossible to have him keep still long enough during waking hours to take a radial pulse accurately. It is usually much easier to take the pulse from the carotid artery in the neck or from the temporal just in front of the ear. It should be done by making gentle pressure with the tips of the fingers, for, if too great pressure is used, the circulation will be shut off, and, too, it is not improbable that the nurse's pulse may be counted instead of the child's.

Functional Disturbances.—Owing to the rapid growth of the heart in young children, it is not infrequent for functional disturbances of the circulation to result. It is, however, always important to determine whether they are functional or organic, as in both cases the future well-being of the child may depend upon the care it receives. (See chapter on Heart Affections, p. 235.)

Lymphatic System

"The lymphatic system begins in the microscopic crevices between the cells and fibres of almost all tissue." They are the receptacles of the fluids which exude from the adjacent tissues. They communicate very freely among themselves and empty into the larger lymphatic vessels.

Lacteals.—The outer surface of the body is rich in lymphatic vessels, as well as the inner tissues. The lymphatics in the intestinal walls do not differ essentially from the others, except that during digestion they carry the chyle, which resembles milk in

appearance. They are therefore frequently called *lacteal vessels.*

Lymphatic Ducts.—Ultimately the lymphatic vessels empty their contents into the veins at the base of the neck, through two openings known as the *right* and the *left lymphatic ducts.*

Lymphatic Nodes.—Scattered through the lymphatic channels are lymphatic nodes or lymphatic glands, which serve as the filters, and, figuratively speaking, are the police stations of the body.

Any foreign substances, such as bacteria, which enter the tissues are taken up by the lymphatics and carried to the lymphatic glands, where they are either destroyed, or the gland structure is destroyed or at least undergoes increase in size and sometimes breaks down, forming an abscess.

In many children the lymphatic glands of the neck are always enlarged, as well as the pharyngeal tonsils and the post-nasal lymphatic tissues, which, when much increased in size, are called adenoids. Enlarged glands in the neck are frequently due to infections from the tonsils and adenoids, although in some children a moderate enlargement may be normal (lymphatic diathesis).

Respiratory System

The act of breathing is automatic, although to some degree it is under the control of the will.

It is probable that the accumulation of waste products in the blood acts on the nerve centres, which in turn act upon the muscles of respiration, resulting in an elevation of the chest wall and retraction downward of the diaphragm, thereby tending to create a vacuum. The air then rushes in through the upper air passages and bronchi, inflating the air vesicles, and coming into intimate relation with the blood through the thin walls of the capillaries. By this means the blood gives up its waste products, carbon dioxide and carbon monoxide, and takes up the necessary amount of oxygen.

Nose Breathing.—The natural channel through which the

air should pass to the bronchi is the nose. The air is thereby filtered to some extent by the moist mucous membrane and is at the same time warmed before it enters the lungs.

Results of Mouth Breathing.—Any obstruction to the nasal passage making it necessary to breathe through the mouth is liable to be followed by some inflammation of the air passages, pharyngitis, laryngitis, or bronchitis, and there is prone to be more or less cough. Some deformity of the chest wall also results from mouth-breathing, particularly of the lower anterior portion. This deformity is usually manifested by a transverse groove known as Harrison's groove.

Abdominal Breathing.—The breathing in young infants is largely abdominal in character, that is, the elevation or retraction of the diaphragm results in sufficient air entering the lungs without much chest expansion. This is a frequent cause of alarm to young mothers, who, when the child is asleep, suddenly notice that there is little or no movement of the chest-wall. By uncovering the abdomen in such cases the movement of the abdominal wall may be readily seen.

Thoracic Breathing.—As the infant becomes older the abdominal breathing diminishes and the chest breathing increases.

Frequency of Respiration.—The frequency of the breathing in young infants is at birth from thirty to forty per minute. As the child grows older it gradually diminishes, until at adolescence it varies from eighteen to twenty per minute.

The frequency of respiration is, of course, markedly increased by exercises as well as by pathological conditions. There are, however, certain cerebral affections which produce a slowing of the respiration. This will be taken up under "Meningitis."

Rhythm of Breathing.—The rhythm of the breathing in young children is liable to be irregular, particularly during sleep, and may at times assume something of the Cheyne-Stokes character. This is also frequently a source of anxiety to young mothers as well as to all members of the household.

The Digestive Tract

The digestive tract may be divided anatomically, as follows: The mouth and pharynx; the œsophagus; the stomach; the small intestine; the large bowel or colon; a group of accessory glands, including the salivary glands, liver and pancreas.

THE MOUTH

Sucking.—In the young infant the chief function of the mouth is the act of sucking which is a complicated procedure requiring the joint action of the lips, gums, jaws, tongue, roof of the mouth, cheeks, and sucking pads. "Sucking is a reflex action in the new-born babe which is carried on by the pressure of the gums against the ampullæ of the lactiferous ducts. The nipple is held in a trough formed by the tongue pressed against the hard palate."

The Salivary Glands.—The secretions of the salivary glands are active at birth and have a feeble digestive action on starches which continues for some time after the food has reached the stomach. The mixture of the saliva with the milk helps the further action of the gastric secretions.

The *œsophagus* requires little attention, save as the site of certain abnormalities to be considered later.

THE STOMACH

The stomach at birth lies obliquely in the left side of the abdomen, directly under the diaphragm, extending from left to right. As age increases its position becomes more horizontal. The stomach at birth is nearly cylindrical, but the fundus increases in size very rapidly during the first year but does not reach its full development until quite late in childhood.

Following is the average amount of food taken at the different ages, as observed by weighing before and after nursing:

At birth	½–1 oz.	At three months	5–6 oz.
At one week	2 oz.	At six months	6–7 oz.
At two weeks	2½ oz.	At nine months	7–8 oz.
At four weeks	3–4 oz.	At twelve months	8 oz.
At eight weeks	4–5 oz.		

These figures for the first weeks after birth are greater than those given by many authorities, but they may be verified by weighing the baby before and after nursing, when it will be found that the quantity received at different times varies greatly, but many times, particularly in the early morning nursings, is greatly in excess of what has been considered the stomach capacity at that age. These figures were obtained by weighing at four-hour intervals—five nursings in twenty-four hours.

Functions of the Stomach.—The stomach in the new-born infant does not play a very important rôle in the digestion of the food, but acts rather as a reservoir. It is true there are certain active ferments capable of digesting proteid, and even fat [2] and starch to some slight extent, but the large part of the digestion takes place in the small intestine. The proteid is acted upon in the stomach by the pepsin in the presence of hydrochloric or lactic acid.

Pepsin and both hydrochloric and lactic acids are found in the stomach at birth. Pepsin is capable of transforming proteid into peptone in the presence of the amount of these acids secreted.[3]

Coagulation of Milk by the Rennet.—The coagulation of the milk in the stomach occurs as a result of the action of the rennet ferment. Mother's milk coagulates in a light flocculent precipitate, while cow's milk, unless boiled or diluted with some alkali or gruel, coagulates in dense curds.

Muscular Contraction of the Stomach.—The small end of the stomach, called the pylorus, is closed by circular muscular fibres which relax at intervals, allowing some of the stomach contents to pass into the duodenum. The milk begins to leave the stomach almost immediately, its progress being accelerated by the rhythmic contractions of the stomach walls. The upper openings of the stomach, or cardiac sphincter, is but feebly

[2] Sedgwick, Jahrbuch für Kinderheilkunde, June, 1906.

[3] Ramsey, Walter R., Jahrbuch für Kinderheilkunde, August, 1908; Archives of Pediatrics, August, 1908.

closed in the infant, so that regurgitation of food occurs readily from increased pressure or change of position.

Time Required to Empty the Stomach.—The time necessary under normal conditions for the infant's stomach to empty itself depends upon the character of the food and the quantity given. The stomach of the average healthy baby on the breast will be found empty in one and one-half to two hours after the meal, while the emptying of the stomach of a healthy infant on cow's milk will usually require considerably longer. High fat percentages and strong dilutions of cow's milk greatly lengthen this time. It was found by Cannon that solid particles of food which would not become fluid or semi-fluid greatly impeded the emptying of the stomach.

Further discussion of the stomach functions will be considered under the chapter on "Vomiting."

THE INTESTINES

Length of the Intestines.—The intestinal tract in the infant is relatively much longer than in the adult. In the new-born, the length of the intestines is six times that of the body, while in the adult it is only four and one-half times as long.

THE SMALL INTESTINE

The small intestine is divided anatomically into three parts: duodenum, jejunum, and ileum.

The *duodenum*, being directly continuous with the pyloric end of the stomach, plays an important rôle in the process of digestion of the food. It is here that the secretions from the pancreas and liver empty into the bowel and become mixed with the food. The liver in the infant is relatively much larger than in the adult. The secretion of bile begins soon after birth and is well established within a week or ten days. All the pancreatic secretions are present in the new-born, although in small quantities. The most important of the digestive ferments found in the duodenum are the following:

Trypsin, acting best in an alkaline medium and converting proteid into peptone.

Diastase, converting starch into sugar.

Lipase, splitting fat into fatty acids and glycerine.

The sudden flow of bile, according to some authorities, is responsible for the frequency of jaundice in the new-born infant (see Chapter XVI). This, however, is not established.

As the process of digestion progresses the food is moved along by muscular contraction of the intestinal walls, the digested product being absorbed by the lacteals.

The small intestine joins the large intestine at right angles at a point on the right side of the abdomen at the ileocæcal valve.

The Colon.—The large bowel, or colon, begins in a blind pouch, called the cæcum, and from this extends a rudimentary constricted portion, called the *vermiform appendix*. It is probable that little digestion occurs in the large bowel, although there are ferments found, capable of digestive action.

Functions of the Colon.—The chief function of the large bowel is that of absorption, the lower portion, or rectum, acting as a reservoir for the fecal matter until nature or convenience prompts its evacuation.

The colon is divided into three portions, according to position: ascending, transverse, descending.

Sigmoid Flexure.—The lower part of the descending colon in the infant is thrown into a sharp fold, known as the *sigmoid flexure*. It is at this point that sometimes in artificially fed infants great masses of fecal matter collect, producing persistent constipation.

The *act of defecation* is an involuntary act produced by contraction of the circular muscle fibres of the rectum, together with the abdominal muscles and diaphragm, accompanied by a relaxation of the sphincter. Although in the young infant the act of defecation is involuntary, it soon becomes more or less voluntary, and the infant after a few months may be taught to empty the bowel at regular intervals.

BACTERIA

At birth the digestive tract is free from bacteria, but after the food has been ingested it swarms with micro-organisms of many varieties. Most of these under ordinary conditions are not disease-producing. Some of these organisms, the colon bacillus, for example, may produce serious trouble under certain conditions, and particularly if it gains entrance to other organs, such as the urinary tract.

A large part of the fecal matter is made up of bacteria of various forms.

The intestinal flora (bacterial content) of the bowel is changed radically with the character of the food.

The character of the predominating bacteria in children fed on breast milk is radically different from those of children fed on cow's milk.

The Ductless Glands

Besides the glands which empty their secretions through ducts into the digestive tract and other cavities of the body, there are a number of others whose secretions are of vital importance to the growth and development of the individual. These glands have no ducts through which their secretions are carried, nevertheless their products are absorbed and carried throughout the body, probably by both the lymphatics and the blood stream. The most important of these glands are: the spleen, the thymus, the thyroid and parathyroids, the suprarenals, the pituitary, the pineal, the testes, and the ovaries.

THE SPLEEN

The spleen is the largest of the ductless glands. It is situated in the left hypochondriac region behind the stomach, and extending from the eighth to the eleventh ribs. It is relatively larger in infants than in adults, and is prone to become markedly enlarged by any of the infectious diseases.

Enlargement of the Spleen.—In malaria and typhoid

fever the spleen is frequently so large as to be palpable below the margin of the ribs.

There are certain conditions of the blood (splenic anæmia, splenic leukæmia) in which the spleen is enormously enlarged. These conditions are not uncommon in children and usually terminate fatally. It is also frequently enlarged in rickets. Careful microscopic examinations of the blood should be made in all cases to determine the exact character of the disease.

THE THYMUS

The thymus is a temporary organ, situated mostly behind the sternum, in front of the lower portion of the trachea and large bronchi. It appears at the second month of intra-uterine life. At birth it measures about two inches in length, and about one-half inch in thickness, and weighs about one and one-half drachms. "It is largest when the child is two or three years old and weighs then about six drachms. From that time on it steadily atrophies, and has nearly disappeared by the fifteenth year." In infants the gland has a particular significance, since sudden enlargement sometimes occurs resulting in pressure upon the nerves and trachea or bronchi, producing marked attacks of dyspnœa and sometimes sudden death. Sudden enlargement of the thymus may be associated with general lymphatic enlargement throughout the body. This condition is known as status lymphaticus.

THE THYROID GLAND

The thyroid gland consists of two lateral lobes connected by a narrow portion called the isthmus. The isthmus usually lies across the second, third, and fourth tracheal rings.

In infancy the glands are relatively larger than in the adult.

Cretinism and Myxœdema.—The secretions of this gland are absolutely essential both to the physical and the mental development of the child. The congenital absence of the thyroid, or insufficient secretion from the gland, produces the condition

known as cretinism in the infant, and myxœdema in the adult (page 174).

Enlargement of the gland is common in children; and especially in girls about the age of puberty, producing what is clinically known as goitre. Unless excessively large and producing symptoms of pressure, simple goitre has no special clinical significance and may be disregarded. In many cases the enlargement gradually disappears. An increased secretion of the thyroid gland produces a chain of symptoms—muscular tremor, rapid heart, and sometimes protrusion of the eyes—known as hyperthyroidism or exophthalmic goitre, which is, according to all authorities, extremely rare in young children.

THE PARATHYROIDS

Imbedded in the surface of each lateral lobe of the thyroid body are two little masses, each one about one-quarter inch in diameter, one in the inner and one in the outer aspect. They are called the parathyroid glands. Their absence is supposed to be a causative factor of tetany.

THE SUPRARENAL GLANDS

"These glands are situated in the epigastric region, resting upon the top and the inner and front surfaces of the kidneys, to which organs they are attached by areolar tissue."

That they are essential to life has been demonstrated by the fact that death quickly ensues when they are entirely removed, and also by the fact that their degeneration is soon followed by disease. Their precise function is still unknown.

The secretion of these glands (adrenalin) has a profound influence on blood-pressure and on other functions of the body, such as general muscular activity and sugar metabolism.

PITUITARY BODY

This is a small gland found at the base of the brain, the function of which is but little known. Disease of this gland is sup-

posed to produce an affection known as acromegaly, in which there is an abnormal growth of the bones.

PINEAL GLAND

Also a small gland found at the base of the brain, the functions of which are little known.

Cases, however, are on record in which tumors of this gland were associated with precocious development of the genital organs. "Nearly all of the cases have been in boys between four and eight years of age."

OVARIES AND TESTES

The principal functions of these glands are, of course, the production of ova and spermatozoa.

In addition, both of these glands have an internal secretion which is essential to the proper development and maintenance of various bodily functions.

The Brain and Nervous System

The brain is contained within the cranium, which cavity it completely fills. There is no special difference in the appearance of the brain of the young infant and that of the adult. Its functions, however, in the infant, are to a great extent undeveloped. During the first year of life, the brain makes an enormous growth; in fact, the growth during the first year exceeds the growth during the entire remaining life of the individual.

Circumference of the Head at Different Ages.—During the first year the head increases a little over four inches in circumference, while from the beginning of the second to the fifth year there is an increase of about two and one-half inches. From the fifth to the twentieth year there is only an increase of approximately one inch. So that practically the entire growth of the brain occurs during the first six years. Such an enormous growth during the first year is only possible because the sutures and fontanelles remain open.

Early Closure of Fontanelles and Sutures.—Occasionally the sutures and fontanelles close during the first few months. In such cases the growth of the head remains almost at a standstill (microcephalus). Whether the closure of the sutures and fontanelles in these cases is due to arrested development of the brain, or whether this premature closure of the sutures is responsible for the lack of brain development, there is still some doubt. It is probable, however, that the defect rests primarily with the brain itself.

Instability of the Nervous System.—Associated with the rapid growth of the brain during the first year, is a marked instability of the nervous system, and most of the early functions are but poorly developed.

The child is more helpless than the young of any of the other animals, and continues to be absolutely dependent for the first two years, at least.

Instinct.—Instinct is but poorly developed in the infant as compared with other animals.

Development of the Special Senses

Preyer,[4] who observed the development of the different functions in his own children, beginning after birth, has made the following observations:

Eye Reflexes and the Development of Vision.—The pupils reacted to light at birth, and when bright light was brought close to the eyes of the sleeping infant the eyelids closed tighter. When the baby was awake, if the light was suddenly brought close to the face it closed its eyes. Infants distinguished light from darkness as early as the seventh day after birth.

At two months the eyes followed bright objects to some extent. At ten months the child gave evidence of satisfaction when the lamps were lighted.

During the first few days the eyes remained open a very short time, sometimes one remaining open while the other was closed.

[4] Preyer, Die Seele des Kindes.

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When the hand or other object was suddenly brought in front of the eyes there was no evidence of reaction by way of winking or any other facial movement up to the fifty-fifth day.

In the fourteenth week there was a strong reaction shown by the eyes to rapidly approaching objects.

There began to be coördinate movements of the eyes as early as the thirty-first day after birth, and by the forty-sixth day the strabismus, or incoördination, had largely disappeared.

At ten months the convergence was very good.

At four months objects were followed with the eyes.

At eighteen weeks the child reached for objects held in front of its face.

Hearing.—The ears probably begin to functionate soon after birth, or as soon as the Eustachain tubes are inflated with air.

Sensation to pain is little developed at birth, but rapidly develops during the first month.

Taste.—Taste is early developed and during the first month the infant distinguishes between sweet and sour and bitter.

Smell.—The sense of smell, although absent at birth, is early developed. It was observed by Preyer that infants as early as the end of the second or third week were able to distinguish, by the sense of smell, breast milk from cow's milk or soup.

Touch, Pain, and Temperature.—The sensibility to touch, pain, heat, and cold is present at birth to a limited extent, but increases rapidly and is well developed within the first few weeks.

CHAPTER III

CARE OF THE NEW-BORN INFANT

As soon as the child is born it should begin to breathe. In order to do this freely all secretions should be removed from about the nose and mouth. This should be done with a little sterile absorbent cotton wet in normal salt or boric acid solution. Gauze stretched over the index-finger should not be used, as the mucous membrane of the mouth is injured thereby. From this time on until the teeth come through no further care of the mouth is necessary. The secretions of the glands keep the mouth sufficiently clean so that any further effort is liable to do more harm than good.

Tying the Cord.—For the tying of the cord a stout linen or silk ligature should be provided, which has been thoroughly sterilized by boiling for fifteen or twenty minutes.

The cord is usually tied immediately after birth, but under certain circumstances the tying is somewhat delayed.

In the case of very full-blooded babies, who are somewhat blue when born, the cord is sometimes cut and the infant allowed to bleed slightly before the ligature is tied. In most cases, and especially where the infant is pale and weak, the pulsations in the cord are allowed to cease before the cord is tied. This should never be done except under the supervision of a physician.

The cord is usually tied at a point one to two inches from the umbilicus. Two ligatures are applied and the cord is cut between. After it is cut the end of the stump is touched with a solution of iodine (one-half tincture iodine, one-half alcohol).

The child usually begins to cry directly after birth, thus materially aiding in a proper inflation of the lungs with air. When the child does not cry and show proper symptoms of breathing, means should be taken to aid respiration.

This may be done in several ways. Dousing the face and

chest with cold water is a favorite means of stimulating inspiratory effort.

The lungs may be inflated by directly blowing air into them, mouth to mouth, or through a tube introduced into the nose or into the larynx direct. This is done only under extreme necessity, the attending possible dangers of infection to the infant or attendant being apparent. (A pulmotor may be used to advantage.)

Artificial Respiration.—A simple method of producing artificial respiration is the following:

Place the palm of one hand under the shoulders and back of the head, the palm of the other hand, with fingers widely spread, under the lower part of the pelvis, posteriorly. Forcibly bend the upper portion of the body backward, describing such a curve as shown in Figs. 10 and 11. This results in forcing the chest wall upward and the diaphragm downward, thus tending to create a vacuum in the chest. The air rushes in to fill this vacuum, thus inflating the lungs. The next movement is exactly the reverse: bringing the child's head and chest forward so that the body is bent at an acute angle. This results in diminishing the size of the chest cavity by lowering the ribs and allowing the diaphragm to ascend, thereby driving a part of the air out of the lungs. This movement should be repeated eighteen or twenty times a minute, stopping at intervals to see if the infant will take up the work alone, and as soon as it is demonstrated that it is breathing, the artificial means should be discontinued. The infant, however, should be carefully watched and artificial respiration resumed whenever necessary.

Temperature of Room and Loss of Heat.—It must be remembered that new-born infants stand exposure to cold badly, so that if it is necessary to use cold water or artificial respiration, every effort must be made to protect them from loss of heat. The temperature of the room should be 85° or 90° F., and whenever possible the work should be done under cover of a warmed woollen blanket.

Fig. 10.

Fig. 11.

Fig. 10.—First position in performing artificial respiration.
Fig. 11.—Second position in performing artificial respiration.

Under normal conditions, as soon as the cord has been tied the baby is wrapped in soft warm blankets and removed to an adjoining room which has been properly heated (70° to 75° F.) and placed in a properly prepared basket (Fig. 12), an ordinary clothes basket painted white, 3 feet long, 18 inches deep, with a hair mattress; a woollen blanket may extend from beneath the mattress over the sides of the basket for greater warmth.

FIG. 12.—In a properly prepared basket.

BLEEDING FROM THE CORD.—The cord should be carefully watched at close intervals during the first few hours for bleeding, and if any is present it should be retied on the proximal side with a good stout ligature of linen or silk which has been properly sterilized. The cord should be wrapped in sterile gauze as soon as it is tied and the same degree of aseptic precautions taken in guarding it against infection as would be taken in an open wound in the abdomen, since the opening in the cord communi-

cates for a time directly with the blood stream, the collapsed vessels running directly to the liver and vena cava.

The Subsequent Care of the Cord

Whatever dressings the cord receives, the important points are: to keep it free from infection, and to have it "dry up" and "fall off" as soon as possible.

After cleansing the skin around the navel, the cord should be enveloped in sterile gauze on which some sterile powder, as starch or bismuth, may be dusted. It is questionable whether the powder in many cases serves any useful purpose, and if it is not absolutely sterile it is, of course, an added source of infection. In the course of a week or ten days, nature forms a line of demarcation at the skin margin, and the dried mummified cord becomes separated. The raw surface is quickly covered with epithelium and becomes inverted into the umbilicus.

Infection of the Cord.—If any infection occurs the skin around the umbilicus at once becomes red, and not infrequently a considerable amount of pus is formed.

Erysipelas and Tetanus.—The navel is not an uncommon point of infection with erysipelas, which is, of course, serious, if not always fatal, in young infants.

Other forms of infection, such as tetanus (lock-jaw), not infrequently have their origin in the cord.

Whenever any evidence of infection of the cord or of the skin around the umbilicus occurs, the physician's attention should be called at once to the condition, the old stump should be removed and dressings wet with boric acid, or normal salt solution, applied.

Granulations in the Umbilicus.—Not infrequently a very mild infection occurs which does nothing more than delay the healing of the umbilicus after the separation of the cord. As a result of this mild infection, granulation tissue forms, not infrequently forming a *polypoid growth*, the size of a pea, with a small pedicle at the base. Such a condition will keep up

a continuous discharge from the navel for weeks or months. It is usually necessary for the physician to pick up the growth with forceps and tie a ligature around the pedicle, after which it promptly dries up. The only subsequent care which such a condition demands is the maintenance of perfect cleanliness until healing occurs. A little sterile cotton wound on a small probe and dipped in 50 per cent. alcohol will, if introduced into the folds of the umbilicus, keep the wound clean.

Umbilical Hernia

The umbilical opening is naturally one of the weak points in the abdominal wall. Normally the opening closes as soon as the cord separates, or even before. In a rather large percentage of cases, for some reason or another, the umbilical opening does not close and there remains an opening which allows abdominal contents, a knuckle of intestine, or portion of omentum, to protrude. This is known as *umbilical hernia* (Fig. 13).

Causes of Hernia.—This condition may be due to several causes. Congenital defect in the abdominal wall is probably the most common. Infection is probably also a common cause. Prolonged crying before the umbilical opening has closed is undoubtedly an element also in its production. A snug, not tight, abdominal binder should be worn until the umbilical opening has closed; the band in normal cases may then be removed.

Adhesive Straps for Umbilical Hernia.—When hernia has already occurred the best means of securing an obliteration of the hernial opening is by an adhesive strip, two inches wide and six to eight inches long, applied across the abdomen tightly enough to secure apposition of the lateral margins (Fig. 14). This strip should consist of oxide of zinc plaster, and should be left in place as long as possible, or until it begins to loosen or becomes soiled. Usually it may remain a week or ten days without being changed.

In order to remove it and dissolve the gum from the skin, benzine must be used, having constantly in mind the inflammable

and explosive character of this fluid. If the skin is much irritated it may be necessary to apply some sterile gauze over the irritated places and to make the adhesive strip longer, thus put-

FIG. 13.—Umbilical hernia.

ting less tension on the skin in any one place. These strips will usually have to be worn for several months before a cure can be secured.

FIG. 14.—Application of adhesive strap for cure of umbilical hernia.

The old-time button or coin as a remedy for umbilical hernia is worse than nothing, as it only serves to crowd the abdominal muscles further apart.

YARN TRUSSES.—Inguinal or groin hernias in infants are best treated by means of yarn trusses (Fig. 15). A skein of soft wool yarn of the proper length is passed around the body, just above

FIG. 15.—Yarn truss for the treatment of inguinal hernia.

the iliac crests, and a slip noose formed in front so that the knot comes directly over the hernial ring. The free end is then passed between the thighs and along the line of the gluteal fold and

tied or pinned behind and somewhat to one side. The truss may be protected from the discharges by means of a piece of oiled muslin rolled around the yarn where it passes between the thighs. Several skeins should always be on hand so that the soiled one may be removed and another applied. These should be worn night and day for several months, at least. Before the truss is applied the hernia should be carefully reduced. This can usually be done with the child in a recumbent position, the pelvis being somewhat elevated and the thighs flexed on the abdomen. If the hernia cannot be reduced readily, and there is any evidence of strangulation, as evidenced by pain or shock, a physician should be summoned at once.

Hydrocele is a rather common affection in infants in which there is an accumulation of fluid along the spermatic cord and in the scrotum. This is often mistaken for hernia. A hydrocele may sometimes be reduced by pressure, so that the physician's attention should always be called to any enlargement in the region of the groin so that a differential diagnosis may be made.

Care of the Eyes

The eyes should be washed almost immediately after birth with a solution of warm boracic acid, and if the mother has had any previous vaginal discharge, *a 2 per cent. silver nitrate solution,* freshly made, should be dropped into both eyes. In many States this is now compulsory in all cases, and, since it is a recognized fact that 80 per cent. of all cases of blindness in children are produced by infections contracted at the time of birth, it is probable that in the near future this law will be enforced in all States. It should be remembered that silver nitrate stains the linen black, and should therefore be carefully used.

In all cases where any inflammation of the eyes becomes apparent, as evidenced by redness or gluing of the eyelids together by secretion, the physician's attention should be called to the condition at once; a smear should be made and examined under the microscope, and if the condition is found to be gonorrhœa the most heroic measures will be necessary to save the sight.

For mild infections a solution of argyrol, 15 per cent., dropped into the eyes at three- or four-hour intervals, will frequently result in a cessation of the infection. Solutions of argyrol should be made fresh every few days.

If there is any discharge, the eyes should always be irrigated with warm boric acid solution before any other medicine is introduced.

Such medication as silver nitrate should never be used in the eyes except under the direction of a physician. (See chapter on Gonorrhœal Ophthalmia, page 166).

Care of the Skin

Vernix Caseosa.—The skin at birth is of a pink color and covered by a cheesy substance called vernix caseosa. The quantity of this substance, however, varies greatly in different individuals. It is tenacious in character and rather difficult of removal. It may be necessary, in order to remove it without using undue friction, to anoint the skin with oil (preferably olive oil) and then roll the baby up in warm blankets for a period of six to twelve hours. If the baby is delicate, or the vernix caseosa unusually great in quantity, the bath may be dispensed with for twenty-four hours or longer.

First Hair.—The body of the infant, including the head, is covered with a growth of fine hair. Not infrequently the color of the hair on the head is quite different from that on the body. After a few weeks or months this first hair falls out, to be replaced, as a rule, by another, usually less profuse, crop, many times of quite a different color.

In bathing young infants several important points must be kept constantly in mind.

The room should be warm—80° to 85° F. During cool weather, when the regular heating plant is not in operation, some other heat should be provided. A fireplace, electric heater, gas heater, or oil stove may be utilized to advantage. In the use of

gas stoves one must be extremely careful, as not infrequently sufficient gas escapes to be extremely injurious to the infant. One must also remember that a gas heater or oil stove in a small bath-room quickly exhausts the oxygen. Infants should therefore not be kept in such a room longer than necessary.

Soft and Hard Water.—The water for the bath should be, if possible, rain water; that is, what is generally known as "soft water." If "hard water" is used some borax may be added to advantage (one teaspoon to one gallon).

Temperature of Water; Soap.—The water should have a temperature of 98° to 100° F. The soap should be of the best quality (castile), as cheap soap frequently contains free alkali and is extremely irritating to the delicate skin of the infant.

Wash Cloths.—Wash cloths of soft material should be used, and after they have been used once they should be discarded, until they have been washed and boiled. Soiled wash cloths are frequent sources of infection. It is well, therefore, to have two sets of wash cloths of different materials.

Friction of the Skin.—Little friction should be used in washing the skin, and if the vernix caseosa is not readily removed at the first bath it may remain until the second or third. Undue friction during the bath associated with an impure soap is frequently followed by a diffuse rash in which the skin is intensely red and covered with tiny pustules. This condition may be readily relieved by discontinuing the bath for a few days and keeping the skin powdered with stearate of zinc.

During the first week or ten days, or before the cord comes off, only sponge baths should be given, which should not last more than five or ten minutes. If the temperature of the room is below 80° F. the bath should be given under a blanket. Sponges should not be used because they cannot be kept clean.

In bathing an infant special attention should be directed toward the folds of the skin, particularly about the genitals, under the arms, and in and back of the ears. After carefully removing all secretions, the skin should be powdered with talcum powder.

or better, stearate of zinc, except about the genitals in female children.

Excoriation of the Skin.—If the skin is already excoriated about the genitals some bland ointment, such as oxide of zinc, should be used to protect the skin from the irritating action of

Fig. 16.—Shower bath.

the urine and stool. In these cases liquid albolene or olive oil may be used to sponge the skin instead of water.

The diapers should be changed always as soon as they are soiled, and the skin washed with warm water and the ointment reapplied.

Bathing the Genitals.—In bathing girl babies about the genitals the following precautions should be observed, in order

to prevent infections of the urinary tract by fecal matter: After removing a soiled diaper the skin should first be cleansed in the region around the genitals. Separate pledgets of cotton should then be used, sponging always backward and away from the urethra.

After bathing, the skin should be dried with a soft towel by sponging, not by rubbing.

FIG. 17.—Folding bath-tub.

After the first few weeks the sponge bath may be dispensed with and the baby put in the tub, or, better still, given a shower (Fig. 16).

A great variety of bath-tubs are on the market. The accompanying Fig. 17 shows a convenient form of folding tub which, with the folding table (Fig. 18), may be put out of the way after the bath is over.

SHOWER BATH.—In institutions where many infants are to

be bathed one after another, bath-tubs should never be used. The baby should be placed on a porcelain slab, covered with a folded bath towel. This towel should be changed for each infant and the slab well showered off. An apparatus such as shown in Fig. 19 is now in general use in hospitals. The water in the tank is first mixed to the proper temperature by the attached thermometer (95° to 100° F.). The bath should be of short duration and the infant, after careful drying, should be wrapped in warm blankets.

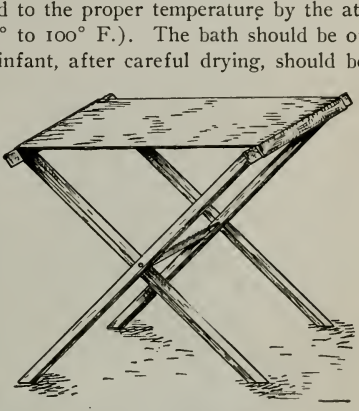

Fig. 18.—Folding table.

Cold Baths.—Cold baths should never be given to young infants, as they lose heat rapidly and usually do not react. Sudden chilling of the skin will usually be followed in infants by catarrhal affections of the respiratory and digestive tracts. After a few months the temperature of the bath may be somewhat reduced, and after one year the chest and neck as well as the face may be sponged with cool water.

It should be borne in mind that babies can get along without baths for a limited period when the condition demands it. Olive oil rubs may be substituted.

Bathing of Older Children

In older children the daily "tub" is a fine way to begin the day. A short dip in cool water and a good vigorous rub put children in a good frame of mind, which they are apt to carry throughout the day. In children who are prone to take cold easily, daily sponging of the chest and throat with cold water will often do much to lessen this tendency.

Care of the Genital Organs

There is a great diversity of opinion among physicians as to the proper care of the genital organs in boys.

According to the Jewish Ritual, which has been in vogue for three thousand years, all male infants are circumcised. This was primarily a sanitary precaution, which became, like all their laws, a part of their religious duties.

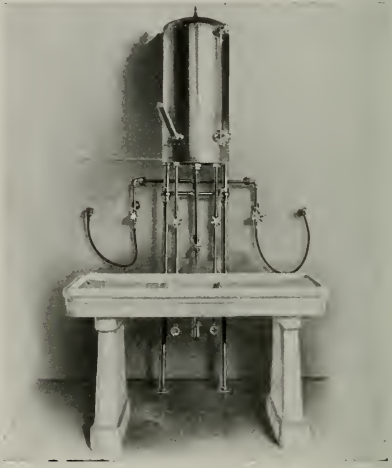

Fig. 19.—Shower bath for infants. The water is first mixed in the tank to the proper temperature.

An adherent foreskin is normal in all male infants. There is, however, a great difference in the character of the opening and in the length of the foreskin in individual cases.

A large percentage of all cases, if left alone, will right themselves in a few months. There are, however, cases in which the foreskin is so tightly adherent around the urinary meatus that it will never become normal, so that it can be pushed back. There

are other cases in which the foreskin is so long that, even if it can be pushed back, it is almost impossible to keep the organ free from secretions, which quickly become foul and irritating.

The best opinion, therefore, now, is that the foreskin should be left alone for the first few months, in order to see if nature will take care of the condition herself. If any local irritation arises in the meanwhile, the physician must decide how best to meet it. It may be necessary to stretch the foreskin and push it back, or it may be better in certain cases to perform circumcision. There is undoubtedly far too much interference, on the part of both medical men and nurses, with the genital organs of infants.

After the foreskin can be readily pushed back, this should be done two or three times weekly during the bath and the organ cleansed, the same as the rest of the body. No special attention should be drawn to the genital organs, and close watch should be directed to the possible formation of habits (masturbation), which can more easily be prevented than cured.

For female infants it is usually sufficient to keep the genital organs clean. All secretions should be carefully removed from the folds with warm water and sterile pledgets of cotton. Female infants are particularly susceptible to infections of the genito-urinary tract, so that the utmost care must be taken against possible contamination.

Dusting powders, such as talcum, boric acid, etc., should never be used in or about the vagina in infants. They simply serve as a foreign body and produce irritation.

If some irritation is already present, a simple ointment, such as vaseline, may be used to protect the mucous membrane from the action of the urine until the surface becomes normal.

CHAPTER IV

THE NURSERY AND ITS EQUIPMENT

The room chosen for the nursery should be of good size and have at least two windows, which should face in different directions. The room should be so located that it will have the direct sunlight for a part of each day, at least. A south and east facing room is generally to be preferred, since during the winter months the sun shines in these windows the greater part of the day, and during the mid-summer months the intensely hot afternoon sun is to a great extent avoided.

Flies should be absolutely excluded, as they are frequent sources of infection, as well as discomfort.

The windows should be provided with screens, dark shades, and awnings for summer. The old-fashioned green shutters are a valuable adjunct to a nursery, as they may be closed and so arranged as to shut out most of the light and still admit the air. Hangings should be as far as possible dispensed with and only the simplest wash curtains permitted.

The Floors.—The floors should be of hard wood and partially covered with small rugs which can be readily washed. A vacuum cleaner is the ideal way of cleaning the floors and walls, and if sweeping is necessary the baby should always be removed from the room, and for at least an hour afterwards. Carpet sweepers are preferable to sweeping with a broom, since by the latter process the dust simply changes location.

The Walls.—The walls of the nursery should be of plaster which has been painted some restful color and which may be wiped down with a damp cloth without injury. Hangings and pictures with frames should be dispensed with as far as possible and in place a fresco of appropriate figures may be substituted.

Ventilation.—The air in the nursery should be fresh. It is,

FIG. 48.—Teterelle breast pump, for premature infants. The mother makes the necessary suction, and the milk flows down the tube into the baby's mouth. Owing to the tubing, they are difficult to keep clean and therefore are not to be recommended for general use.

therefore, necessary to have a constant change of air from without. The old rule requiring three thousand cubic feet of air per hour per person is still a safe one to follow, although recent investigations have apparently to some extent modified this law.

During the summer months, when the weather is warm, it is not difficult to live up to this requirement, but in winter it becomes a problem, when the temperature of the room must be maintained.

Opening a window slightly both at top and bottom creates a rotary motion of the air, thereby promoting good ventilation.

There are various kinds of window ventilators which are more or less efficient.

At least once daily the windows should be thrown wide open and the wind allowed to blow freely through the room. This, however, is not in itself sufficient, and some change of air, however slight, should constantly be enforced.

Not more than one person should be in a small room at one time with a baby, and when it is asleep it should be alone. The nurse should sleep in an adjoining room with the door open, so that any noise, coughing, vomiting, crying, etc., may be heard.

A bath-room adjoining the nursery is not a necessity, but a great convenience.

Temperature.—The temperature of the nursery for the first few months should be about 70° F. during the day, and at night slightly lower. The only time when the temperature should be above this point is during the bath, and if there is an adjoining bath-room where the temperature may be more easily maintained the nursery need never be raised above 70° F. After a few months the temperature at night may be as low as 60° F., and after the first year as low as 40° F.

Young infants should never be put to sleep in a zero temperature. Because all infants so exposed do not have pneumonia is not an argument in its favor.

The essential thing is that the air be fresh. It is not necessary that the air should be cold in order to be fresh, and all cold

air is not by any means fresh. For example, it is a common occurrence to see a whole family, father, mother, and several children, sleeping on a porch with the windows all closed. The air may be cold, but is anything but fresh.

Electric Fans.—During hot weather an electric fan is most useful in a nursery. No matter how hot, if the air can be kept in motion, an infant with a scant enough supply of clothing can usually be kept comfortable.

Heating.—The heating of the nursery is a matter of great importance. In the modern home in the city and larger towns a central heating system is generally in use. This may be hot water, steam, or hot air. Perhaps the one which can be most uniformly regulated is hot water. In addition to the general heating plant, an open fireplace or wood stove is invaluable. There are many days during the spring and fall, after the furnace fire has been discontinued, when some heat in the nursery is absolutely necessary. An open fireplace is also a valuable aid to ventilation.

Moisture.—A certain amount of moisture in the air is absolutely essential to health. Open dishes with water should be placed on the radiators, or cans which are adjusted to and behind the radiators. The amount of humidity should be not less than 50 or 55 per cent.

Lighting.—The nursery should be preferably lighted by electricity, proper shades being provided. Next to this a kerosene lamp is to be preferred; it should, however, never be allowed to burn during the night, as it creates a smell, and, like any other flame, uses up the oxygen. A gas jet should never be allowed in a sleeping room. It is dangerous, and, even if no one "blows it out," there is usually enough gas escapes, even when turned off, to contaminate the air and make it a menace to health.

If some light must burn at night in the nursery, a small wax candle will show sufficient light and use up a minimum of oxygen.

Beds.—By far the best bed for a new-born baby is an ordinary clothes basket which has been painted with white enamel. If any draping is used it should be of simple wash material. The basket should be fitted with a properly fitting mattress stuffed with fine excelsior, or hay, or, if something more expensive is desired, it may consist of hair or moss. The mattress should be protected by a waterproof sheet, and this in turn covered by a cotton pad; otherwise the discharges will soon render it foul and therefore useless. Feather pillows should not be used as a mattress; they are hot and unsanitary, particularly in warm weather.

The advantages of the basket during the first months are that it is cheap, readily moved about, and the high sides offer a protection from the cold as well as from possible injury (by being sat upon, for example). The basket should be placed on a low table or on two chairs (see p. 33).

At the age of six months to a year the baby may graduate and in the future occupy a real bed instead of the basket.

The crib should be of iron or wood painted with white enamel. The sides should be capable of being lowered (Fig. 20), and for hospital use a bed in which the springs and mattress can be raised within the frame to the desired height. This is a great convenience in case of illness, as the constant stooping over a low bed is extremely fatiguing to the attendants. The mattress of the crib may be of the same materials as that of the basket and should be covered with waterproof material and a cotton pad.

In addition to the bed, or basket, a nursery should contain the following articles of furniture and other utensils:

Folding Table.—A folding or ordinary kitchen table upon which the baby may be dressed, undressed and changed (see p. 43). The top should be covered with oil-cloth, which should be washed off daily with a damp cloth.

A bed screen, to be covered with simple wash material.

Dressing Table.—A dressing table with a glass or porcelain top and a shelf below, also of glass or porcelain. A railing one

inch high should surround the top and shelf, to prevent articles from falling off. The legs of the table should be provided with large castors so that it may be readily moved about the room. It

FIG. 20.—The Hornsby bed.

should be low enough to be reached by the nurse without getting up. The table should be equipped with the following articles:

1. One bath thermometer.
2. Clinical thermometer.
3. Talcum powder (unscented).
4. Stearate of zinc powder.
5. Tube of yellow vaseline. (The jar vaseline is unsanitary.)
6. Boric acid crystals.
7. Box zinc oxide ointment.
8. Bottle of alcohol.
9. Bottle of sweet oil or olive oil.
10. Castile soap (best quality).
11. Blunt bandage scissors.
12. Safety pins (assorted sizes).
13. Needles and white thread.
14. Soft wash cloths and towels.
15. Soft baby hair-brush.
16. Absorbent cotton (sterile).
17. Tooth-picks, to wrap cotton on, as swabs (to be discarded and burned after using).

In a wardrobe close by should be a stock of proper clothing, and particularly a large supply of clean diapers and towels.

Beside the table should stand a low chair, without arms, for the nurse.

An air-tight receptacle for the soiled diapers should stand preferably in the adjoining bath-room. The diapers may then be taken at any time to the laundry, but if it is necessary to preserve them for the physician's inspection, they may be kept without rendering the air of the nursery unwholesome. Diapers should be washed with white soap, rinsed through two waters and boiled before being hung up to dry.

Scales.—The nursery should also contain scales for the regular weighing of the baby (page 67).

After the baby is one year old a chair and table of the proper relative height may be provided.

CHAPTER V

TIME TO BE SPENT OUT OF DOORS

During the summer months, when the weather is warm, even very young infants should be out of doors as much as possible. They can, however, usually get sufficient sun and air on their own porches, or in their own yards. Infants should be kept as quiet as possible and should never be pushed about the street in a carriage or taken in an automobile. Such procedures expose them to dust and excitement, from which they will certainly show the effects in catarrhal inflammation of the upper air passages and in restlessness and inability to sleep.

During the extremely hot weather the rooms on the shady side of the house will frequently be found cooler than out of doors. Screened beds, which can be placed on the porch or extended from the window (Figs. 21 and 22), may be purchased or readily made, by a simple frame covered with mosquito netting.

In crowded parts of the city, particularly in the tenements, children should be taken into the open spaces in the parks as much as possible during the hot weather.

During the winter months in the northern climate it is frequently a difficult problem to decide just how much time young infants should spend out of doors.

Vigorous infants who are born at the beginning of winter should, during the first two or three months, be taken out only when the temperature is above 50° F., and then not when the wind is blowing strongly and the air is full of dust.

After five months the baby may sleep out of doors when the sun is shining and the temperature is not much below the freezing point (25° to 30° F.). If infants are gradually accustomed to sleeping in progressively lower temperatures no harm results,

FIG. 21.—Screened bed, which can be readily moved about.

FIG. 22.—Screened bed extending from the window.

up to a certain point. Children who are suddenly taken from a warm room and put out to sleep at zero temperature are liable to develop catarrhal inflammation of the respiratory tract.

The important thing to remember in this connection is that young children do not tolerate well extremes, either of heat or cold.

It must be here again emphasized that it is not necessary that air shall be cold in order to be fresh.

CHAPTER VI

SLEEP

Infants during the first year should sleep about three-quarters of the time.

During the second year they should sleep two-thirds of the time, or about sixteen hours out of twenty-four, and up to the sixth year children should sleep twelve to fourteen hours, that is, twelve hours at night and two hours during the day.

Effects of Sleep.—It is during sleep that the process of repair is probably most active. The remarkably rapid growth of the brain during the first years, together with the numberless impressions made daily upon the brain cells, makes a proper amount of sleep, under the most favorable conditions, an absolute necessity—if we are to have, later in life, a normal individual.

Respiration During Sleep.—The sleep of young infants and children should be practically noiseless. The respirations are deeper and slower than during waking hours, although in young infants the rhythm is many times very irregular, and, as described before under "Respiration," is largely diaphragmatic in character.

Nose- and Mouth-Breathing.—The infant should breathe through the nose, with the mouth closed. Mouth-breathing is not at all uncommon even in new-born infants, and it indicates the presence of a large postpharyngeal tonsil (adenoid).

Temperature of Room.—The air during sleep, as well as during the waking hours, should be fresh, but during the first few months the temperature should not go below 50° F. An infant should never sleep in the same bed with the mother or nurse, but should have a bed of its own. It is not uncommon that infants are accidentally smothered by sleeping with the mother.

An infant who sleeps with the mother is liable to nurse at intervals throughout the night—much to the detriment of both mother and infant.

Infants should be nursed and then put down, and not taken up unless to change, for at least one hour after feeding.

Rocking and Walking the Baby.—Infants should not be rocked or walked to sleep, since the baby will usually promptly wake again as soon as the movement ceases and the process will have to be renewed, with a consequent loss of much energy and sleep on the part of the mother and the household generally.

If a baby is well and comfortable, "not soiled," and has a sufficient amount of food (breast milk) at proper intervals, it will sleep three-quarters of the time during the first months.

Restlessness During Sleep.—Some of the common causes of restless and irregular sleep are: overfeeding; too much clothing; sleeping in a hot, badly ventilated room; having been spoiled by rocking, walking, etc.; discomfort from soiled diapers; hunger; inability to breathe properly through the nose, due to acute coryza or adenoids; rickets, or some other form of malnutrition; constipation (hard masses of fecal matter in the rectum); infections generally—particularly of urinary tract.

A baby should sleep on a mattress, made preferably of hair.

Position During Sleep.—There should be no pillow, but the mattress should have a gradual incline. the head being a couple of inches higher than the lower part of the body. It will be found that if the upper part of the body is slightly higher than the lower, the baby will not regurgitate as much food as if, as is generally the case, its heels are higher than its head.

The position of a child should be changed at intervals. It may be placed, directly after feeding, on the right side, and later on the left.

Soiled Diapers.—When the diapers are soiled it should be taken up and changed at once. An infant who is allowed to lie all night in a diaper soaked with urine, or in addition fecal matter, will usually sleep badly and the skin under the diaper will

usually be irritated, with an added possibility of an infection of the urinary tract.

Children during sleep should be as undisturbed as possible. They should have their own room and no light should be allowed. Every one in the household, however, should not be made to whisper in order to secure absolute quiet for the baby. If infants are properly trained they will usually sleep soundly throughout the usual sounds which occur in the routine of household duties. Loud, sudden noises, however, should be avoided.

Sleep After the Third Year.—Children after the third year frequently sleep too much during the day and not enough at night. Children should be put to bed regularly at the same hour, six or seven o'clock, and during the day, with the exception of the nap of a couple of hours, should be out of doors in good weather, even in winter, running and playing about. Children who are physically tired will eat better, digest better, develop better, and sleep better than those who are pushed about in a perambulator or taken about the country in a limousine.

Mid-day Nap.—The habit of taking a nap in the middle of the day (directly after lunch is the best time) should be enforced as long as possible. Children who are active throughout the day, either at school or at play, should relax for at least one hour, even if they do not sleep. If overworked mothers could be persuaded to adopt a rule of resting for a half-hour or so in the afternoon, the responsibilities of rearing a family would assume a rosier hue than they many times do.

CHAPTER VII

TEMPERATURE

The normal temperature of an infant, as of an adult, is 98⅔° F. There are slight variations from this temperature within the normal, either above or below. A *transient* variation of ½ degree either above or below this point usually has no significance.

During the first week not infrequently infants develop a temperature of several degrees without any apparent cause, and frequently without any serious significance, as it often reaches the normal again within a few hours. It is probable that the lack of fluid and the introduction of food and bacteria into the intestinal tract may temporarily interfere with the heat centres, resulting in an increased production or a diminished dissipation, or both combined. The proper place to take the temperature is the rectum (Fig. 23). Temperatures taken in the groin, or under the arm, are inaccurate, and if the skin is moist the thermometer will not register.

Before taking the temperature care should be taken to shake the thermometer down below normal. It should then be anointed with vaseline and inserted into the rectum beyond the mercury bulb. The time necessary to take the temperature will vary with the make of the thermometer (2–5 minutes). Great care must be taken that with a struggling child the thermometer is not broken in the rectum, thereby producing possible serious injury.

FIG. 23.—Taking the temperature by the rectum.

CHAPTER VIII

THE GROWTH AND DEVELOPMENT OF THE CHILD

There is considerable variation in the weights of individual children at birth. Children born of large parents are liable to be larger than those born of small parents. When the parents are healthy and the mother well nourished, babies at birth are liable to average higher than if the mother is badly nourished.

Average Weight at Birth.—After weighing many thousands of healthy infants at birth, it has been found that the average weight for boys is about seven and one-half pounds, and for girls about seven pounds.

Weight of Twins.—In case of twins the combined weight of the two usually somewhat exceeds the average weight of single births. One twin, however, is liable to weigh considerably more than the other, although it is not uncommon that they are nearly equal.

Loss of Weight During the First Weeks.—During the first two weeks there is usually some loss in weight, varying from a few ounces to one pound. This loss in weight is due to several factors. There is, first of all, the vernix cascosa, which is removed by the first bath. The infant usually passes urine soon after birth, and the *meconium* is passed in considerable amount during the first few days. Combined with the considerable loss in weight from these factors, the new-born receives little or nothing from the mother during the first day or two, and not sufficient, oftentimes, until the end of the first week, or even longer.

The loss in weight during the first week, then, may be re-

garded as physiological, and no concern need usually be felt unless the loss persists beyond the second week. If, however, the baby shows evidence of prostration, means should be taken to determine the amount of milk it is receiving by weighing before and after nursings.

Gain in Weight During the First Year.—The relative gain in weight and body measurements during the first year is enormous. For example, an infant weighing seven and one-half pounds at birth should at six months double this weight, and at one year treble its weight. In other words, an infant weighing seven and one-half pounds at birth should weigh approximately fifteen pounds at six months and twenty-one pounds at the end of the first year.

Increase in Measurements.—During this time there is a correspondingly rapid increase in the measurements. For example, the average height of a male infant at birth is about twenty inches; at the end of the first year it is about twenty-nine and one-half inches—a gain of over nine inches. The circumference of the head, which at birth is about thirteen and one-half inches, is almost eighteen inches at the end of the first year, being a greater increase than during the remainder of the life of the individual.

Other Measurements.—During the first two years there is a remarkable uniformity in the increase in size of the head and chest. At birth the circumference of the head is 13.8 inches, that of the chest 13.1. At the end of the first year the circumference of the head is 17.9 inches, that of the chest 17.9 inches, and at the end of the second year 19.1 and 19.5 inches, respectively.

The maximum normal measurement of the head at five years equals the minimum adult measurement. The following chart gives the average increase in growth of the infant from birth to the sixteenth year.

		Weight.	Height.	Head circumference.	Chest breadth.
Birth	Boys	7.47	20.1	13.8	13.0
	Girls	7.13	19.9	13.3	12.4
6 mos.	Boys	16.0	25.4	16.5	16.6
	Girls	15.5	25.0	16.5	15.6
12 mos.	Boys	21.2	29.2	17.9	17.9
	Girls	20.4	28.7	17.9	18.2
18 mos.	Boys	22.8	30.0	18.5	18.5
	Girls	22.0	29.7	18.0	18.2
2 yrs.	Boys	28.4	33.1	19.1	19.5
	Girls	27.8	32.7	18.3	18.2
3 yrs.	Boys	33.5	36.0	19.3	20.1
	Girls	31.5	35.6	19.0	19.8
4 yrs.	Boys	36.4	38.6	19.7	20.7
	Girls	35.1	38.4	19.5	20.5
5 yrs.	Boys	41.4	41.7	20.3	21.5
	Girls	40.2	41.3	19.9	21.2
6 yrs.	Boys	45.1	44.0	20.0	23.2
	Girls	43.6	43.4	19.8	22.8
7 yrs.	Boys	49.5	46.1	20.0	23.7
	Girls	47.8	45.8	20.0	23.3
8 yrs.	Boys	54.5	48.5	20.5	24.4
	Girls	52.2	47.8	20.2	23.8
9 yrs.	Boys	59.8	50.0	20.6	25.1
	Girls	57.4	49.6	21.2	24.5
10 yrs.	Boys	66.0	52.0	20.6	25.8
	Girls	63.0	51.7	20.5	24.7

		Weight.	Height.	Head circumference.	Chest breadth
11 yrs.	Boys	71.5	53.8	20.8	27.2
	Girls	69.9	53.8	20.7	25.8
12 yrs.	Boys	78.8	55.6	21.0	27.5
	Girls	80.0	56.6	20.9	26.8
13 yrs.	Boys	86.0	57.8	21.1	27.7
	Girls	89.9	58.6	21.5	28.5
14 yrs.	Boys	97.2	60.5	21.3	28.8
	Girls	99.3	60.3	21.3	30.0
15 yrs.	Boys	104.1	62.9	22.2	30.5
	Girls	107.5	61.5	22.0	31.0

From the foregoing chart is will be seen that the following gains in weight and length are made by the average child during the first ten years.

	Gain in weight, pounds.	Gain in length, inches.
First year	13½	9½
Second year	7½	3¾
Third year	5	3
Fourth year	3	2½
Fifth year	5	3
Sixth year	3¾	2½
Seventh year	4½	2
Eighth year	5	2½
Ninth year	6	2
Tenth year	5½	2

Up to the eleventh year the gain in weight and height of boys and girls is about uniform, the weight of girls being from one to one and one-half pounds less than boys, and the height being also slightly less.

Gain During Puberty.—From the eleventh to the fifteenth year girls gain faster in weight than boys, but after adolescence has been well established the boys again forge ahead of the girls, both in weight and height, and maintain this superiority throughout the active period of life.

Muscle Development.—The muscles at birth are poorly developed, with the exception of more or less incoördinate movements of the arms, legs, and eye muscles. The development of the muscles takes place rapidly, and the number, force, and precision of the movements soon become apparent.

The following table gives the average time of development of the muscular functions. It must be understood that with this development there is also a corresponding development of the bones and ligaments, as well as of the nervous system, without which any muscular movements are impossible.

TABLE GIVING THE TIMES AT WHICH THE DIFFERENT BODILY MOVEMENTS ARE DEVELOPED (AFTER PREYER)

Movements.	First attempt.	Well established.	Remarks.
Turning head	4th day	16th week	.....
Holding up head	11 weeks	16 weeks	.....
Gripping with hands	117 days	19 weeks	.....
Raising upper part of body	16 weeks	22 weeks	Lying on back without help.
Indicating with hands	8 months	9 months	.....
Sitting	14 weeks	42 weeks	Withoug propping or assistance.
Standing	23rd week	48 weeks	Alone.
Walking	41 weeks	66 weeks	Alone.
Getting up alone	28 weeks	70 weeks	Without taking hold of anything.
Walk over the door-step	68 weeks	70 weeks	.....
Kissing	12 months	23 months	.....
Climbing	26 months	27 months	.....
Jumping	27 months	28 months	Without hesitation and any help.

The foregoing statements must be considered only as averages, always remembering that there are exceptions to every rule.

Talking.—The development of speech (articulation) is usually very slow, although there is a great variation in the time at which different children begin to talk. Speech is always long preceded by an understanding of what is said to the child and what it wishes to say in return.

At the ninth or tenth month infants begin to say "Mamma," "Papa," but will not usually repeat these syllables after the mother or nurse before the eleventh month.

By the fifteenth to eighteenth month the child will frequently, when told, close its eyes, indicate where the watch is, or its eyes or ears, "pat-a-cake," etc. At the beginning of the third year children are frequently able to form short sentences, but it is usually not before the thirtieth to thirty-sixth month that such sentences as "Please give me a piece of bread" can be clearly spoken.

Many children have difficulty for a long time in pronouncing words beginning C, G, J, K, L, Tr.[1] If a child does not begin to speak by the end of the second year he should have a careful examination for deafness or other signs of defective physical or mental development.

Significance of Weight and Measurements

In order to determine definitely whether a child is gaining properly in weight it should be weighed weekly during the first year. A normal baby on breast milk should, after the first week or ten days, gain steadily in weight. The weekly gain during the first six months should average about six ounces per week, or about one and one-half pounds per month, so that the weight at six months will be about double that at birth. During the second six months the gain in weight is not quite so rapid, averaging normally about four ounces per week, or one pound per month, so that at the end of the first year the weight will be approximately three times that at birth, or twenty-one or twenty-two pounds. The average gain of eight ounces per week, as generally given in the text-books, is too high and is the source of much confusion, for if an infant should gain eight ounces per week for the first six months it would weigh nineteen and

[1] Preyer, Die Seele des Kindes.

one-half pounds at six months and twenty-nine pounds at one year—an amount which is universally considered by authorities as decidedly above the normal.

It is not infrequent that in normal infants the weekly gain in weight will not be altogether uniform; for example, the gain one week may be four ounces, and the next eight—making an average of six ounces.

Significance of the Weekly Gain in Weight.—When the weight remains at a standstill for several weeks there is something lacking in the baby itself or in the quantity or quality of the food.

Technic of Weighing.—Babies should be weighed at the same time during the day; in the morning directly before or after the bath is the most convenient time. The same relative time to the feedings should be pursued, as a child weighed one time before a feeding and the next time after would hardly give a fair estimate of the weekly gain. In conjunction with the weighing the other measurements of head, chest, and length should be made monthly, always having in mind that there are considerable variations within the normal in the individual child. A record of weights and measurements should be kept, as they may be of great value to the physician in the event of illness which may later develop.

The normal weight curve, which to the average mother is the all-important thing, is, however, only a portion of the requirements of a normal child. Going hand in hand with the normal weight and measurements, there must be a normal development of the different tissues and organs. The baby must have a healthy rosy color of the skin and mucous membranes. There must be a proper tone to the muscles and the bones must show evidence of proper development.

Infants who are fat and who may enjoy the distinction of having their pictures on the bill-boards, advertising some patent food, may nevertheless be pale, flabby, and suffering from rickets.

For weighing children it is important to have accurate scales (Figs. 24 and 25), as mistakes in the baby's weight, particularly if there is an apparent loss, are liable to produce a panic in the

FIG. 24

FIG. 25

FIGS. 24 and 25.—Scales for weighing babies and older children.

household. The cheap dial scales, which depend upon the recoil of a spring, are usually incorrect.

THE WEIGHT CHART.—A weight chart (Fig. 26) is a proper means of keeping the weights during the first year. This, however, is not indispensable and the weekly records may be kept in a book, or on a card kept for that purpose.

The Teeth

The teeth are in the jaws at birth, but, of course, undeveloped. The teeth develop with the other bony structures, and when the average baby is about eight months old the first teeth appear through the surface of the gums. There are many exceptions when babies have teeth much earlier than eight months, and there

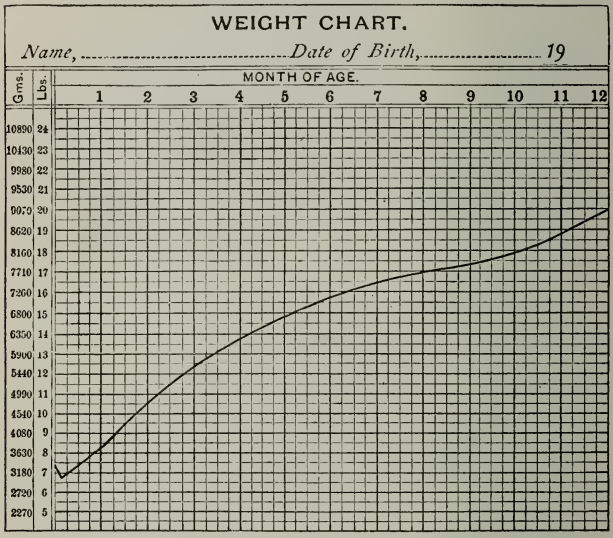

Fig. 26.—The weight curve of the first year.

are cases on record in which infants have been born with teeth. This, however, is the exception.

The First Teeth.—The first teeth to appear are usually the lower central incisors, then the two upper central incisors. The next in order are the two upper lateral incisors. At one year the baby has normally six teeth. The order of the normal eruption of the milk or deciduous teeth is given in the following table:

TIME OF ERUPTION OF THE DECIDUOUS TEETH

1. Two lower central incisors..... Six to nine months.
2. Four upper incisors..... Eight to twelve months.
3. Two lower lateral incisors and four anterior molars..... Twelve to fifteen months.
4. Four canines (stomach teeth)..... Eighteen to twenty-four months.
5. Four posterior molars..... Twenty-four to thirty months.

At one year, a child should have ..... 6 teeth.
At one and one-half years ..... 12 teeth.
At two years ..... 16 teeth.
At two and one-half years ..... 20 teeth.

It must be remembered that these are averages and that there are many variations within the normal.

Marked delay or irregularity in cutting the teeth is usually due to rickets or some other form of malnutrition.

Effects of Illness.—In children suffering from malnutrition, or who have suffered from some acute disease, such as measles or scarlet fever, the teeth are frequently lacking in enamel when they come through the gums, and are liable to decay during the first years.

The milk teeth should remain intact until the seventh or eighth year, when they are gradually replaced by the permanent teeth.

SYMPTOMS ARISING FROM CUTTING OF THE TEETH

Like the liver in adults, the teeth in children have been blamed for all the ills to which infancy is heir.

The fact is that most infants cut their teeth without any symptoms whatever.

In a small percentage of cases, especially in those of a nervous temperament, there are some slight symptoms which may be attributed to teething. The process of cutting teeth is a continuous one extending over the first two and one-half years.

Severe symptoms, attended by high fever, vomiting, diarrhœa, must therefore never be attributed to teething, etc., but to some other cause.

It occasionally happens that before the crown of a tooth appears on the free surface of the gums there is some slight local redness, the baby may be fretful, drool much, and have some

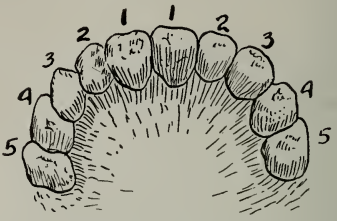

FIG. 27.—Temporary or milk teeth; 1, central incisor; 2, lateral incisor; 3, canine or eye tooth; 4, first molar; 5, second molar.

slight fever, or the stools may be somewhat loose. In such cases the food should be diluted one-third to one-half with water for a day or two, and if the baby is nervous a warm bath at bedtime will often result in a relief of the nervous tension.

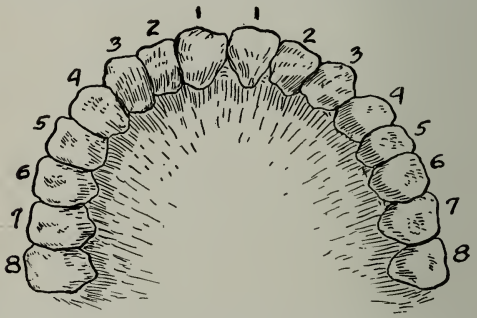

FIG. 28.—Permanent teeth; 1, central incisor; 2, lateral incisor; 3, canine; 4, first bicuspid; 5, second bicuspid; 6, first molar; 7, second molar; 8, third molar or wisdom tooth

It is rarely necessary to lance the gums over the crown of a tooth. This, however, in the individual case must be left to the judgment of the physician.

FIG. 29.

FIG. 30.

FIG. 29.—Front view of the upper and lower models of a child 13 years of age, showing irregular teeth and retarded bone development, especially in the maxillary region. This child had constricted nasal passages. (Dr. G. B. Steadman.)

FIG. 30.—Front view of upper and lower models of same child 14 years of age, after orthodontic treatment of one and one-half years. Nasal breathing was very much improved by the expansion of the dental arches and development of bone. (Dr. G. B. Steadman.)

THE PERMANENT TEETH

By the time a child is six years old the jaws have so developed that there is room, in addition to the temporary set of twenty teeth, for four more. These appear behind the temporary molars at the angle of the jaw, one on each side above and below. At six years a child should have twenty-four teeth, four of which are permanent. At seven or eight years the central and lateral incisors become loose and are replaced by the permanent

FIG. 31.—Hutchinson teeth.

teeth, usually larger and frequently serrated on the cutting edge (Fig. 28). The four bicuspids replace the first molars.

IRREGULARITIES OF THE PERMANENT TEETH.—When there is an undeveloped condition of the jaws, which frequently happens either as a result of congenital defects, mouth-breathing or rickets, the space left for the canine teeth is insufficient, so that the teeth are crowded out of their natural position in the arch. Irregularities of the teeth are very common, but with the special knowledge and appliances the modern orthodonist is able to correct even extreme irregularities. These corrections should be made early, while the bones are still soft (Figs. 29 and 30). A rather common congenital defect is a separation of the two central incisors due to the frenum of the upper

lip being attached to the gums between the teeth, acting as a wedge. This should be removed or the permanent teeth will also be separated. The teeth in congenital syphilis are said to be of characteristic shape (Hutchinson teeth), in which there is a peculiar notching of the upper central incisors. The condition is, however, not necessarily characteristic of syphilis (Fig. 31).

CARE OF THE TEETH

As soon as the teeth are through the gums they should be kept clean.

As long as children are on an exclusive milk diet there is rarely any amount of deposit on the teeth. They, however, should be cleansed daily with a soft brush wet with an alkaline solution.

At three years a child should be taught to brush its own teeth. The space between the teeth should be kept free of food by dental floss. Discoloration on the teeth should be removed with some good tooth powder, and if this is impossible the child should be taken to a dentist. The tooth-brush should be washed in running water after using. Otherwise it becomes foul and may do more harm than good.

A child's teeth should be looked over by a dentist every six months and all cavities filled.

Decayed teeth are undoubtedly the cause of many ills from which children suffer. Many forms of bacteria are harbored in the cavities of decayed teeth, as well as food, which rapidly undergoes decomposition. This becomes mixed with the food, producing serious digestive disturbances.

Inflammation of the gums, and even abscesses at the roots of the teeth, are common. Such accumulations of pus are rapidly absorbed into the lymphatic channels, resulting in enlarged glands, tonsillitis, and serious systemic poisoning. The normal character of the permanent teeth is frequently greatly impaired both by the local infection of the temporary teeth, and by the effects of the generally lowered vitality.

CHAPTER IX

CLOTHING FOR INFANTS

The following list of clothing is appropriate for a young baby. Fewer articles may be provided, but more frequent laundering will be necessary.

Two to five dozen diapers, 20 by 24 inches. These should be of soft cotton material.

Four to six shirts; soft woollen, or cotton and wool, or silk and wool. For hot weather the shirts should be of the thinnest wool, and if the weather is extreme they may be of cotton.

Six bands, flannel or knitted, 6 to 8 inches wide. During the hot weather they may be discarded if a thin woollen skirt is worn.

Six skirts, flannel. During hot weather cotton or muslin should be worn.

Six night-gowns, of outing-flannel or cotton (for summer). They should be long enough to pucker with draw-strings at the bottom over the feet, and large enough not to interfere with the movement of the legs.

One dozen dressing slips, of simple wash material of various weights. Expensive linens with embroidery are only for the rich. There is no good reason for the length extending beyond the feet.

Three blankets, or comforts, of various degrees of warmth for different weather.

Two knitted sacks.

Six to eight quilted pads for the basket or bed.

One cloak.

Two caps: one warm, one cool.

Two veils, without color.

Two rubber blankets, one yard square.

One hair pillow, 10 by 12 inches, 1 to 2 inches thick.

Six pillow covers.

Six sheets.

For stretching stockings and shirts after washing, an appropriate stretcher.

Object of Clothing.—In dressing young infants the greatest judgment is required. The first thing to remember is that clothes are primarily for warmth. In very hot climates, and in temperate climates at times, clothing is worn only to cover nakedness—in other words, for appearance.

Fig. 32.—Diaper pinned in the proper manner.

Where the temperature is so variable as it is in the northern parts of this country, the amount and kind of clothing must necessarily vary greatly.

Young infants do not accommodate themselves readily to sudden and extreme changes either of heat or cold. Infants, if exposed to cold, lose heat rapidly, and are liable to suffer from catarrhal inflammation of the respiratory or digestive tracts. If they are exposed for any considerable time to ex-

cessive heat, the body temperature is liable to be above normal, and they are likewise liable to catarrhal inflammation of the digestive and respiratory tracts. The clothing must therefore be changed according to the temperature.

Prickly Heat as Result of Much Clothing.—Young infants must be dressed so that they are comfortable, but not

Fig. 33.

Fig 34.

Fig. 33.—Waist with broad shoulder straps fitting well up against the neck. (Good.)
Fig. 34.—Waist with narrow straps which fall out on the points of the shoulders, thereby tending to pull them downward and forward. (Bad.)

so warm that the skin is wet with perspiration. In hot weather much of the clothing should be removed. It is a common thing to see infants with so much clothing that they cry incessantly, the skin being covered with prickly heat and the temperature several degrees above normal, and in addition they may have vomiting and diarrhœa.

Tight Clothing.—The clothing about the chest and abdo-

men should be sufficiently loose, so as not to impede either the respiratory or digestive functions. Tight clothing, or bands, about the abdomen, is a common cause of regurgitation of food.

Under Garments.—A form of under garments, including diapers, known as "Vanta Garments," are tied with tapes instead of buttons or safety-pins, and they are an improvement over the ordinary varieties. It is not uncommon that in the application of diapers with the ordinary safety-pins the skin is also included. When a baby shrieks as if in pain, it is always advisable to see if a pin may not be the exciting cause.

In pinning the diaper to the shirt, one must be careful not to pin it too high, producing undue tension on the shoulders, thereby causing deformity (see Fig. 32).

Diapers should be removed as soon as soiled and never used again until washed and boiled.

As soon as children are able to run about the clothing should be suspended from the shoulders, and never from the waist. The exact manner in which the clothing is suspended from the shoulders is, however, of the greatest importance.

Fig. 35.—Blanket wrap for cold weather. (Miss Rena P. Fox, Babies' Hospital, Philadelphia.)

Suspending Clothing from the Shoulders.—The best manner is by means of a properly constructed waist, upon which most of the other clothing is fastened. Fig. 33 shows an ideal pattern with broad shoulder straps fitting well up against the neck, thereby equalizing the weight over the entire shoulder. The ordinary variety purchased in the shops (Fig. 34) has narrow straps which usually fall well out on the points of the

shoulders, thereby tending to drag them downward and forward.

Clothing Within Doors.—For the average well-heated house in this country, the underclothing should not be of very heavy weight. A light woollen shirt and drawers for winter in the northern climate is usually sufficient, with a warm woollen coat for out of doors. Many children are far too warmly

Fig. 36.—Improper shape of sole of child shoe, and proper shape. (Rotch's Pediatrics.)

dressed while within doors, and are, as a result, rendered very susceptible to cold when they venture out. When children are old enough to kick the bedclothes off at night, it is better to wear warm clothing, such as a sweater, leggins, cap, and even mittens, than to depend entirely on blankets.

A very light weight shirt of wool, or cotton and wool, even

in summer, in the north, will be found to protect children from the sudden changes of the temperature and from becoming chilly after vigorous play.

When children are out of doors in cold weather, not only is it necessary to keep the body warm, but the feet, legs, and hands must also be kept warm. Children will not play out of doors in cold weather unless they are comfortably dressed. Overshoes and woollen over-stockings should be provided which can be removed when within doors.

Fig. 37.—Showing position of the foot in a high-heeled shoe.

Dangers of Being Frost-bitten in Cold Weather.—The greatest care must be exercised in wheeling children about in cold weather that they be warmly clothed. The attendant may be thoroughly warm, while the baby may be nearly frozen to death and yet be unable to express itself in appropriate language, other than by crying (Fig. 35).

Young children should not be taken out in zero weather, and, if they are taken out, their faces should be covered, as they are frequently frost-bitten if exposed only for a few minutes.

Shoes.—Shoes should be comfortable, allowing the feet plenty of room (Fig. 36). Cramping of the toes should be absolutely prohibited. Shoes without heels should be worn for several years, and high heels should never be worn, as they tip the body out of line and are liable to produce breaking down of the arches of the feet by throwing an undue amount of weight upon the front part of the foot (Fig. 37).

Sandals with broad toes are excellent for summer and are the next best thing to going barefoot.

CHAPTER X

EXERCISES FOR INFANTS AND CHILDREN

During the first months about the only exercise a baby gets is by moving his arms and legs and crying.

Unrestricted action of all muscles should therefore be permitted, and in no way hampered by the clothing. Daily, morning and evening, when the baby is undressed it should be encouraged

Fig. 38.—"At six months the baby not only lifts its head but begins raising its body on its arms."

to make as free movements as possible. At about three or four months, if a baby is placed on the stomach, it will begin holding up its head, thus bringing into use the muscles in the neck and back (Fig. 38). At five or six months, the baby not only lifts its head but begins raising its body on its arms and also making attempts to bring into use the muscles of the thighs, so that by the eighth or ninth month it begins to raise itself on all-fours and creep about. Such movements give a wide range of exercise

FIG. 39.—Nursery pen. (Feer's "Diseases of Children.")

FIG. 40.—Showing the improper curvature of the spine, resulting from putting a young baby in the sitting position.

to almost all the muscles, and it will be found that infants who are allowed such exercise will be much stronger than those who are kept constantly on their backs and allowed no freedom.

Babies should be allowed all the freedom of movements of

FIG. 41.—A young child in a bad go-cart.

which they are capable (Fig. 39). These positions and exercises should not be forced upon them, as deformity may result. It is important when a baby begins to creep to see that it does not use one leg and one arm to the exclusion of the other. A little

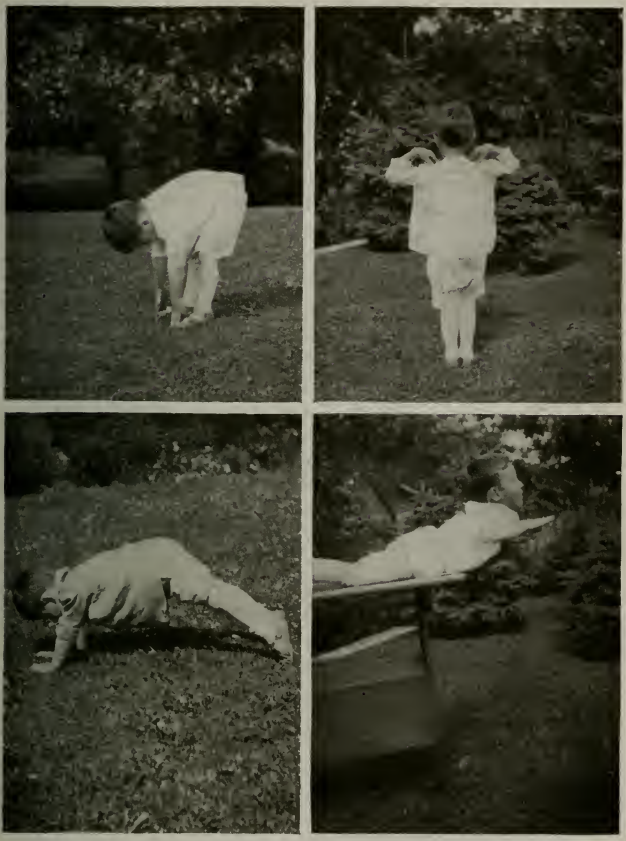

FIG. 42.—A few exercises which may be practised daily to advantage.

encouragement in starting the baby off right will usually suffice to institute a proper gait.

Effects of Erect Positions.—Young infants should never be placed in the sitting position even when propped with pillows; their muscles are not sufficiently developed to maintain the spinal column in its proper position and curvatures are apt to result (Figs. 40 and 41).

As soon as children are old enough to run about they should be out of doors as much as possible. During the summer months they should have a great variety of occupations, so that when they are tired of walking they may sit, and while resting one group of muscles, may be exercising another, in a sand-pile, for example.

Unless there is a good variety of exercises, children in the city are liable to develop the leg muscles and leave the chest, back, and arm muscles but poorly developed.

A few exercises which may be practised daily are all that are necessary in developing the muscles of chest and arms (Fig. 42).

Exercises for Older Children.—Children should walk to and from school if the distance is not too great. The play in which the children indulge when not restricted (by a governess) brings into play most of the muscle groups and for the average healthy child will meet all requirements.

CHAPTER XI

BREAST FEEDING

Of all the mammals the human is the only one which has ever raised the question as to the necessity of nursing its own young.

It has been conclusively demonstrated that there is but one ideal food for infants, and that is mother's milk. In every species of mammal the mother secretes a milk peculiar to its own kind and needs.

As will be later shown, the character of the milks of different animals differs widely both in the percentages of the elements of which they are composed and in their biological character, of which we know as yet but little.

After the child is born, and is separated from the mother by the cutting of the cord, it still remains dependent upon her for sustenance for the greater part of the first year. Any food which may be offered, unless it be human milk, is but a poor substitute, and results in a death rate seven to ten times greater than when the infant receives breast milk.

Colostrum.—The first secretion of the breast is known as colostrum, which is of a light yellow color and alkaline in reaction. It is richer than milk in protein and salts and poorer in sugar and fat. According to Langstein, the protein may be as high as 6 per cent. on the first day (Fig. 43).

The average composition of colostrum is given in the following table (Camerer):

	Per cent.
Water	87.9
Proteins	3.1
Fats	3.3
Milk sugar	5.3
Salts	0.4

After a few days the character of the secretion begins to change and the colostrum is gradually replaced by the true milk. This process occupies from a week to twelve days, and occasionally longer.

Colostrum has a characteristic appearance under the microscope quite different from milk. It contains large cellular bodies called *colostrum corpuscles,* as well as a large number of leucocytes, or white blood-cells.

The average percentage composition of human milk is given in the following table:

Water	87.5
Protein	1.5
Fat	3.5–4
Milk sugar	6.5–7
Salts	0.2

These percentages vary considerably in different individuals, and in the same individual at different times, so that from a single analysis little information of value can be gained.

Average Quantity of Milk in Breasts.—During the first few days there is but little secretion in the breasts. The average daily secretion during the first year as determined by weighing the baby before and after nursings is given in the following table (Camerer):

	Gm.	Oz.		Gm.	Oz.
1st day	10	⅓	7th day	470	15⅔
2nd day	90	3	3rd week	500	16
3rd day	190	6⅓	4th week	600	20
4th day	310	10	8th week	800	26½
5th day	350	11½	12th week	900	30
6th day	390	13	24th week	1000	32

From the sixth to the twelfth month the secretion remains about the same, going occasionally as high as 1200 grammes.

In three hundred consecutive births at the University of Minnesota Hospital where the infants were weighed before and after each nursing, the daily quantity received during the first ten days was considerably less than Camerer's figures.[1]

[1] Ramsey, Walter R., and Alley, A. G., Observations on the Nutrition and Growth of New-born Infants. *American Journal of Diseases of Children,* June, 1918

It not infrequently happens that the quantity of milk secreted during the first week, particularly in primipara, is not as much as given in the above table, and there is a certain percentage of cases, of course, perhaps larger in this country than abroad, where the quantity never reaches that amount.

From a large number of observations during the past ten years, *it has been determined that fully 90 per cent. of all mothers can nurse their babies in whole or in part during the first year.*

The simple fact that the mother has insufficient milk for the baby is no excuse for weaning it. The baby should have all the milk secreted, and if more is required it should be made up with properly diluted cow's milk.

FIG. 43.—Colostrum corpuscles.

REASONS FOR WEANING THE BABY. — There are very few reasons sufficiently weighty to excuse a mother from nursing her baby. Some authorities, notably German, admit of only one, and that is active tuberculosis in the mother. There are undoubtedly others, but they are few Mothers can usually nurse their babies through most illnesses without detriment either to mother or child.

SMALL MORTALITY OF BREAST-FED BABIES.—The mortality in breast-fed babies is only about one-seventh that of bottle-fed babies. Even when the amount of breast milk is insufficient, and when the deficiency is made up with other food, the death rate is much less.

During the siege of Paris, in 1870, the mortality among infants was lower than it ever had been, owing to the fact that it was impossible to get cow's milk and other foods, the mothers being compelled to nurse their babies.

IMMUNITY TO DISEASE.—Breast-fed babies enjoy a certain

immunity to disease which artificially-fed infants do not possess, and are much more liable to recover when they are attacked. It has been pretty well demonstrated that the immunizing principles of the mother's blood may be transmitted to the child through the milk. It is impossible, however, to transmit immunity through the milk except to the young of the same species. Many drugs, including cathartics, are eliminated in the milk, causing disturbance in the infant.

Many of the failures in breast-feeding are due to faulty technic. Almost all babies may be kept on the breast if the conditions of the individual case are carefully studied.

Technic of Nursing.—During the first twenty-four hours it is sufficient to put the baby to the breast two or three times. If there is little or no secretion, a little boiled water may be given with a spoon (one-fourth to one-half ounce). If the water is given through a rubber nipple the baby will frequently refuse to take the breast.

During the second twenty-four hours the baby may be put to the breast every five hours; during the third day every four hours, and from the fourth day on, it may have five or six feedings in the twenty-four hours, at four- or three-hour intervals. The nursings should usually alternate, giving first one breast, then the other. When the secretion of milk is abundant, an infant may be fed at four-hour intervals, with but five feedings in the twenty-four hours. If the milk supply is not abundant, and it is found after a couple of weeks that the baby is not gaining, the feedings may be three hours apart, with five feedings during the day and perhaps one at night, making six during the twenty-four hours. If the quantity is still insufficient both breasts may be given at each feeding.

The common mistake is made in thinking that babies are hungry because they cry and stick their fingers in their mouths, when in reality they are often suffering from colic due to overfeeding.

It is important, therefore, to know the amount of milk the

infant is getting at a meal, and more especially the total quantity of food taken during the entire day.

Weighing Before and After Nursings.—In order to determine this it will be necessary to weigh the baby occasionally before and after nursing, the difference, of course, being the amount of milk taken, unless the baby has passed urine or fæces and the diaper has been changed in the interval.

If there is vomiting of food long after a meal and just before the next meal-time, and in addition if the stools are curdy and green, it is fair evidence in itself that the baby is getting too much milk. Under such conditions the time of nursing

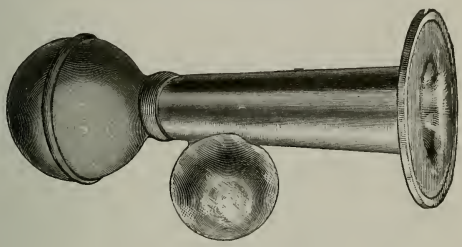

Fig. 44.—English breast-pump.

should be reduced until it is found by weighing that the baby is getting the proper amount, or the total number of nursings may be reduced and the time between feedings lengthened. It is frequently necessary, if there has been considerable digestive disturbance which has lasted for some days, to give the baby a complete rest from food for several feedings, substituting only water or barley water. During this time the milk will have to be regularly pumped or expressed from the breasts (Fig. 44).

Effect of Temperament on Milk Secretion.—There is a great difference between individual mothers in their milk-giving powers. Women of an even temperament will, all things being equal, secrete more milk and of a more uniform quality than those of a neurotic temperament.

Shape of Breasts.—There is also a great difference in the secreting power of differently shaped breasts. The firm, pear-shaped breast with large prominent veins will usually secrete a large amount of milk, which will flow upon pressure from several openings in the nipple. The flat, saucer-shaped breasts and the large, flabby, pendulous breasts will rarely exceed the demands made upon them.

How to Stimulate a Flow of Milk.—The best stimulant to the secretion of milk is a thorough emptying of the breasts. Many mothers will give a very large amount of milk if the breasts are frequently and thoroughly emptied. It is of common occurrence, in children's hospitals, to feed as many as three babies from one wet nurse, the amount increasing with the demands. It has been recently demonstrated by the breast-feeding clinic of the University of Minnesota under the direction of Dr. J. P. Sedgwick that the secretion of milk can usually be increased by expressing whatever remains in the breast after each nursing.

Colic.—The most common cause of digestive disturbance in breast-fed babies is over-feeding. Colic is simply another name for indigestion.

Over-feeding.—Babies who are gaining in weight, four to six ounces per week, are getting sufficient food. If there is vomiting and the stools are large, frequent and full of small white curds, they are over-fed.

The rule should be, to give as little milk as possible and still have the baby gain a proper amount in weight.

Under-feeding.—Occasionally infants are under-fed. Such cases will not gain in weight, the stools are small, sometimes greenish, but rarely curdy. In such cases it will be found, by weighing before and after nursing, that the baby is not getting sufficient milk. *Under such conditions, however, the baby should not be weaned, but given all the breast milk it can get, and the remainder of the meal made up with other food.*

Reasons Why an Infant Refuses to Nurse.—Occasionally it will be found that a baby refuses to take the breast, or if it does take hold, it quickly lets go and cries, and cannot again be induced to make the effort. There are several different causes which may produce these symptoms:

1. An inability to breathe through the nose, and a consequent inability to retain hold of the nipple because of having to open the mouth to breathe. The most common causes of such an obstruction in the nose are adenoids (large post-pharyngeal tonsil) and coryza.
2. Undeveloped or inverted nipples.
3. Insufficient milk in the breasts.
4. Tongue-tied infants.
5. Harelip and cleft palate.

Under such conditions a correct diagnosis will make it possible for the physician to overcome the difficulty.

Fissured nipples are a common cause of infections in the breast, as well as being the source of much discomfort to the mother. The result is that the baby is very often weaned.

Nipple-shield.—After each nursing the nipples should be washed with a saturated boric acid solution or a 50 per cent. alcohol, and if there are fissures a nipple-shield (Fig. 46) should be worn at each nursing until they are healed.

Abscess of the Breast.—It is not necessary to wean the baby in case of abscess of the breast. The abscess should be opened and drained and the baby nursed at the other breast and the milk expressed from the affected side regularly until healed, when nursing may be resumed on that side. Such an abscess usually involves only one segment of a breast and does not, therefore, destroy the breast function, as is generally believed by the laity.

Diet of the Mother.—The diet of the nursing mother is of great importance. The generally accepted belief that mothers can eat but a certain few things, otherwise the baby will have colic, is nonsense.

The mother should have a good full diet, but should not eat foods which will disturb her own digestion. She should not eat between her meals unless she is hungry; otherwise it results in disturbing her digestion and in insufficient food being eaten at the regular meal-time. Plenty of water should be taken

FIG. 46.—If there are fissures, a nipple-shield should be worn at each nursing.

between meals, thus insuring a good quantity of milk of average quality.

Mothers who drink large quantities of milk and gruels between meals are apt to put on flesh rapidly and have a scant milk supply, rich in fat.

EXERCISE FOR THE MOTHER.—Regular exercise in the open air is of vital importance to mothers during the nursing period This is particularly true of women of nervous temperament.

REGULAR HOURS FOR NURSINGS.—Regular hours for nursings

FIG. 45.—Proper position for nursing the baby while lying down.

should therefore be instituted from the beginning. If a mother knows the exact hour when her baby is to be fed, she can arrange to get the proper amount of sleep and recreation, without which no mother can be really normal and happy. By religiously following these rules, many babies will be kept on the breast which otherwise would be weaned. *When for any reason a mother cannot nurse her baby, a wet nurse should be provided.*

The Stools

Meconium.—The stools during the first four or five days after birth consist of a black tarry substance called meconium. This is made up of epithelium and other débris from the intestinal tract.

After four or five days the stools usually begin to have a yellowish appearance, and by the end of the first week, if the secretion of milk has been well established, they are of a normal yellow color and of the consistency of thick gruel. After a few weeks they have more consistency and are later semi-formed.

During the first week, before the meconium entirely disappears, they may have a greenish tinge. This, however, is not what is meant by green stools.

Green Stools.—Occasional green stools have no particular significance in breast babies, if the baby is gaining in weight and otherwise normal.

Stools which are greenish and full of curds are usually due to over-feeding.

Bad Effects of Cathartics.—The common practice of giving castor oil or other cathartics to infants should be absolutely prohibited, as should the use of suppositories and injections.

If nature intended that infants should have these things, they would have been born with a supply.

If cathartics are given, and all the contents of the bowel swept out, no normal movement is possible until the bowel fills up again. If the bowels were left alone until they moved

of themselves, there would be little difficulty with constipation later on.

Regularity of the Stools.—If a breast-fed baby is getting sufficient milk of an average fat content, the bowels will move spontaneously at more or less regular intervals. The average daily number of stools during the first weeks varies from two to four, depending upon the quality and the quantity of the milk. In three hundred consecutive cases, born at the University of Minnesota Hospital, the average daily number of stools during the first ten days was less than two. These babies were fed at four-hour intervals, five feedings in the twenty-four hours.

Frequent loose curdy stools usually means over-feeding.

Constipation.—*Barring anatomical abnormalities there is no such thing as constipation in a breast-fed baby, at least during the first weeks.* This opinion is based upon three hundred cases already mentioned in this chapter in which no infant received any cathartic, suppository, or enema. Occasionally infants who are gaining properly in weight will only have a bowel movement every two or three days, and then only a moderate sized one, of normal color and consistency. In such cases the milk will be found to be of a low fat content, most of it being metabolized, leaving little residue. No concern should be felt in such cases. When the baby is six months old, and some mixed feeding is given in the way of cereals, vegetables, and fruit pulp, the residue will be increased and the stools will usually occur daily.

Almost without exception, constipation in the breast-fed babies is due to the giving of cathartics, suppositories or enemas.

Cathartics, such as castor oil, should never be given to babies unless for specific reasons, and then only on the advice of a physician.

Menstruation of the Mother.—The re-establishment of menstruation during the nursing period has little significance, except that the milk is likely to be scant for a few days, and

occasionally some extra food may have to be given temporarily.

Pregnancy of the Mother.—Pregnancy during the lactation period is sufficient reason for gradually weaning the baby. It is only fair to the mother, to give her a proper chance to maintain her own nutrition, as well as that of the fœtus. The baby by that time has usually reached an age when it can be gradually put upon an artificial food without any serious detriment.

Additional Food

Mixed Feeding.—After a baby is six months old it should have some other food in addition to breast milk, and it will be found that the subsequent nutrition will be improved thereby. At that time thoroughly cooked cereals, such as cream of wheat, oatmeal, or farina, should be given once a day and a little later twice a day before a regular nursing period. The cereal should be cooked two or three hours in a double boiler and should be served thick with a sprinkle of sugar and a very little boiled milk. The amount should be gradually increased from one teaspoonful to four tablespoonfuls by the end of two months. At the seventh month, vegetables, such as carrots or spinach, should be given before another nursing period. The vegetables must be cooked in as little water as possible to which a pinch of salt has been added or a soup stock—mutton, chicken or beef, until soft and tender. A pinch of butter is added and thoroughly mixed. The vegetables should be passed through a sieve and served with the water in which they were cooked, as the water contains most of the iron. Fruit juice may be given as early as the fifth month.

At eight months the 2:00 P.M. nursing may be replaced entirely by vegetables and toast or vegetable soup to which rice or toast has been added.

At nine months, stewed fruits or baked apple may be added, thoroughly mashed.

At the tenth month, one breast feeding may be replaced by whole cow's milk, given from a cup.

Gradually one nursing period is dropped after another until by the end of the first year the baby is entirely weaned and well established on a mixed diet.

Certain susceptible children, as has recently been demonstrated by Dr. Alfred Hess, of New York, may have a yellow discoloration of the skin, including the palms of the hands, from the pigment of carrots or spinach. In such cases the sclera of the eyes is not discolored, differentiating the condition from jaundice.

Weaning.—A baby should be entirely weaned at the age of one year. It is better to do this gradually, beginning by giving one bottle instead of a nursing, then two, so that at the end of a month or two the baby is entirely on artificial food. After it is decided entirely to stop breast milk it is usually better to send the mother away for a week or two, until the baby is well established on its new régime.

Pacifier.—The habit which many children are allowed to acquire, of sucking constantly on a nipple, is a vicious one.

It is usually begun in order to keep babies from crying, when in reality they are suffering either from over-feeding or under-feeding. After the habit is acquired they cry when the nipple is out of their mouths, even when they are otherwise perfectly well. Sucking on a hollow nipple may result in the baby's swallowing large quantities of air, thereby distending the stomach and producing marked discomfort.

Irritation and Possible Infection.—The irritating effect upon the mucous membrane of the mouth is frequently apparent. The roof of the mouth and tongue become inflamed as a result of the irritation from the rubber nipple. These nipples are always dirty, as they are allowed to fall upon the floor, and are put back into the mouth without being even washed. They also offer a favorite attraction for flies, and may be the source of infectious diseases.

Water Between Feedings.—The common habit of giving babies large amounts of water between meals and of allowing

them to go to sleep with a bottle of water, is responsible for many failures of breast feeding. It frequently happens that babies who take large amounts of water through a nipple will refuse to take the breast, probably because the water in a way satisfies their desire for food, and also because they can "draw" so much easier from the artificial nipple than from the mother's.

Gas on the Stomach.—In nursing babies frequently gulp down considerable air which may give them some distress and promote regurgitation of food. Raising the baby to a sitting position or putting it over the shoulder for a moment, before putting it down, after the nursing, will usually result in the gas being expelled.

Premature Infants

A baby born of healthy parents after the seventh month of gestation, if well developed and having a weight of over 1500 grammes (three and one-half pounds), may have a fair chance for life and normal development if the body temperature can be maintained and if it can have breast milk. Infants of a less weight may live and develop normally, but their chances are relatively smaller.

Premature babies should not be bathed, but should be rubbed with warm olive oil, and rolled in warm cotton wool, and placed in an incubator. (No diaper should be worn.) The temperature should be maintained at about 85° to 95° F.

Breck Feeder.—If the baby is too weak to nurse, the milk should be expressed from the mother's breasts and fed to the baby through a nipple or Breck feeder (Figs. 47 and 48).

Amount at Feeding.—The quantity of milk which a premature baby will take at a feeding varies greatly. It is usually less than one ounce. This may be diluted at first with boiled water and later the whole milk given, as it is found that the baby can tolerate it. If there is no vomiting, and the stools are good, the amount may be increased. It is imperative that the amount of food be sufficient to maintain the body weight.

Time Between Feedings.—The time between feedings should be four hours if the quantity taken at a meal will warrant it. It is, however, rather the exception that this is the case, and unless the feedings are introduced into the stomach through a tube, the infant will have to be fed at two- or three-hour intervals for seven or eight feedings.

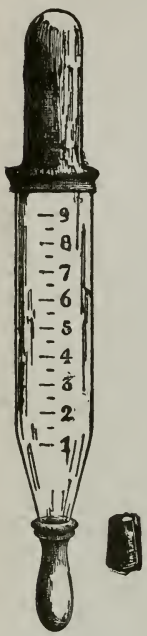

Fig. 47.—Feeder for premature infant. (Rotch.)

The caloric requirements of a premature baby are relatively greater than for a normal infant.

Wet Nurse.—The establishment of the normal milk flow in these cases is difficult, because the baby cannot suck vigorously enough to stimulate secretion. It is therefore usually necessary to secure a wet nurse, with a normal baby of her own. Sufficient milk may be pumped or expressed from her breasts for the premature baby, while her own baby should be allowed to nurse the other mother. This usually results in a normal flow of milk within a few days. After this the services of the wet nurse may usually be dispensed with.

As soon as the premature baby is strong enough it should be put to the breast regularly, as it is frequently difficult to maintain a proper flow of milk by any other means.

Incubator.—The baby should be taken from the incubator only to be changed and nursed. The room should be above 80° F., and the time during which it is kept out should be as short as possible. The patent hospital incubator is complicated and expensive and may be supplanted by an improvised one which may be made at little expense (Fig. 49).

Improvised Incubator.—Secure an ordinary box three feet long by two feet wide and two feet deep. Have it properly

padded inside. The box should have a sliding top. A false bottom made of strips two inches wide, leaving one-inch spaces between, should be placed six inches from the bottom. This space should have a sliding door so as to admit four hot water cans. These cans may be changed at regular intervals, one at a time.

The baby is placed on a mattress which is raised a little above the false bottom, a proper amount of space being left between the mattress and the sides of the box to allow the heat from the

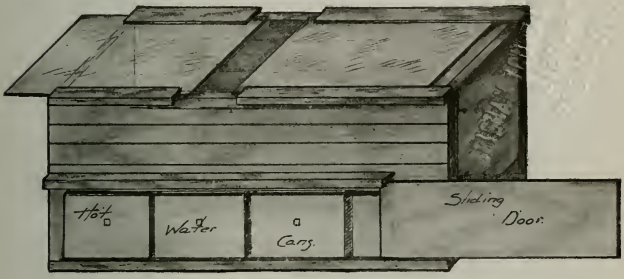

FIG. 49.—Improvised incubator.

hot water cans to enter the upper chamber. A thermometer should be placed on a level with the baby and the cover opened sufficiently for proper ventilation.

For the first days the baby should be watched very carefully and its temperature taken frequently in order that the frequency with which the hot water cans may be changed can be accurately gauged and a uniform temperature maintained.

If the temperature is kept too high, the baby will have fever more or less constantly.

REMOVAL FROM THE INCUBATOR.—If the baby gains in weight and seems vigorous, it may usually be removed from the incubator after a couple of months. Great care should be taken

gradually to reduce the temperature before the baby is taken out and also not to expose it to any undue change for a long time after.

Small Chance of Life on Artificial Food.—Premature babies who are fed upon artificial food have a relatively small chance for life and are likely to be carried off by even a slight illness.

Premature babies after they become vigorous should be subject to the same rules for feeding as other normal children.

Premature babies should not be on exhibition, as they are particularly likely to pick up infections even from persons who are apparently well.

The Wet Nurse

Raising children by means of a wet nurse has always been a common custom among the well-to-do of many countries.

In this country, with the exception of the South, where the colored mammies were utilized as wet nurses during slavery days, the securing of proper wet nurses has always been difficult.

Syphilis.—The difficulty of determining whether a woman might not be suffering from syphilis has deterred many from employing a wet nurse.

Such false doctrines as that of requiring the wet nurse's baby to be the same age as the foster child make a wet nurse difficult to find. The best wet nurse is one who is healthy and who has a normal baby of her own, which she should bring with her, and continue to nurse, at least in part. If a wet nurse is required to give up her own baby, she will, as a rule, be unhappy and will not successfully nurse the other one.

Wassermann Reaction.—Before engaging a wet nurse, she, as well as her infant, should be carefully examined as to their physical condition. A Wassermann reaction should always be made for syphilis, and a smear from the vagina should be made to determine the presence or absence of gonorrhœa. Equal precautions should be taken that a syphilitic baby does not infect

a healthy wet nurse. Women of a sanguine temperament should preferably be chosen, as one with a neurotic temperament rarely succeeds as a wet nurse. A woman addicted to the use of alcohol should, of course, be rejected. The age of the wet nurse's baby, within reasonable limits, has little to do with the case if the mother has plenty of milk.

Technic.—One breast may be reserved for each baby, or, if there is not enough for both, the foster baby may take what it requires and the nurse's baby be allowed to take what remains, the deficiency being made up with some other food. It frequently happens that the extra demand upon the breast results in marked increase in the amount of milk secreted.

Diet of the Wet Nurse.—The diet of the wet nurse, as of all nursing women, should be of plain, nutritious food. Care must be taken lest the nurse gorge herself with rich food, just because it is available. This not infrequently results in the baby's digestion being upset from a too rich milk supply.

Exercise.—The wet nurse should have plenty of exercise in the open air and enough duties to perform to keep her mind occupied. It should be seen to that the bowels are kept in condition, as these women are frequently careless about themselves. To this end, plenty of coarse food should be given, and pastry practically excluded.

CHAPTER XII

ARTIFICIAL FEEDING

The Milk Supply.—The best available substitute for mother's milk is clean cow's milk. The securing of an ideal milk supply for infants is difficult and many times impossible. It is imperative, however, that the best available milk be obtained and that we make every effort in our power by means of education and legislation to improve the character of the milk supply in the community. Trained nurses and welfare-workers, owing to their peculiar position in the home and the community, are especially fitted to educate the public concerning this all-important question.

The source of the milk supply should be carefully scrutinized. The stable should be modern, well aired and kept scrupulously clean (Figs. 50 and 51).

The water supply should be carefully inspected, as wells are frequently contaminated with sewerage.

The cows should be properly brushed and kept clean, especially the flanks, udders and teats. The hands of the milker should be washed with warm water and soap before each milking. Running water should be provided in every stable. All utensils for receiving the milk should be thoroughly washed and scalded. A particular modification of milk pail, which materially limits the amount of dirt which can fall into it during the milking, should be used (Fig. 52).

Milking Machines.—Milking machines (Fig. 53) if kept scrupulously clean make possible a great advance in the securing of clean milk. It must be remembered, however, that milking machines may be a source of great irritation to the udder, if improperly used, and may, also, in case of infections of the udder, spread the disease from one cow to another.

All milk should be strained through several thicknesses of sterilized gauze directly after milking, then bottled, capped, and placed on ice until delivered.

Milk from a Herd and from One Cow.—All things being equal, the milk from a herd is to be preferred to the milk from one cow, because of its greater uniformity. If, however, a

Fig. 50.—Dirty barnyards, wasteful of manure and increasing expense of keeping cows clean. (Courtesy U. S. Bureau Animal Industry.)

family can have its own cow, kept under ideal conditions, the milk is greatly to be preferred to that procurable from the average dairy.

Disease in Cows Affecting the Milk.—The cows should be healthy and carefully watched for any evidence of disease. Tuberculosis is a common disease among cattle. Of 107 samples of market milk, in New York City, 16 per cent. contained tubercle

FIG. 51.—A dirty stable. (Courtesy U. S. Bureau of Animal Industry.)

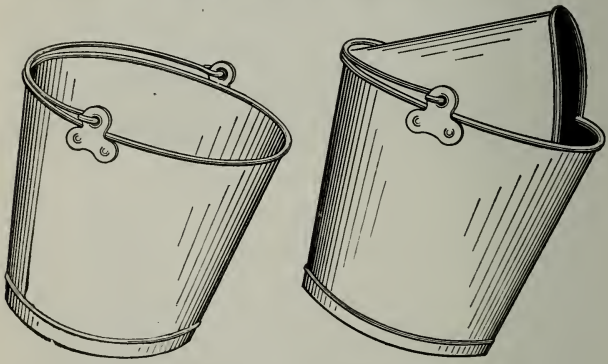

FIG. 52.—Open and hooded milk pails A hooded pail will keep much dirt out of the milk. The hood can be put on by any competent tinsmith for a small price. (Courtesy U. S. Bureau of Animal Industry.)

bacilli. Of 144 samples of market milk in Chicago, 10.5 per cent. contained tubercle bacilli. One tuberculous cow may infect the milk of the whole herd. The bacilli gain entrance to the milk through the udder or through cow manure, the latter forming a large part of the sediment of market milk. All milch cows should be tested at least once yearly for tuberculosis.

FIG. 53.—A Model Dairy, showing milking machine in use. (Broadview Dairy Farm, St. Paul, Minn.)

GARGET.—A disease known as "garget" frequently affects cows' udders, resulting often in abscess formation with large amounts of pus given off in the milk. Streptococci are usually found in large numbers in the milk of cows suffering from "garget." The bovine streptococcus is not particularly malignant to human beings, but if the human type of streptococcus gains access to the milk, either by an infection of the udder with

this organism or by contamination, it becomes extremely virulent. It was this form of streptococcus differentiated by Dr. Theobald Smith and others which caused the epidemic of malignant sore throat which occurred in Boston in 1911.

Other diseases peculiar to cows, such as the foot-and-mouth disease, may produce serious infections in children.

Gastro-intestinal disturbances, due to drinking the milk of cows too soon after parturition, are common. Milk should not be used within 15 to 30 days before, and 5 days after, parturition. Such milk produces diarrhœa, colic, and vomiting, symptoms similar to those due to mastitis or other febrile conditions.

Diseases of Human Origin Spread Through Milk.—The frequency with which epidemics of contagious disease of human origin, such as diphtheria, scarlet fever, typhoid, dysentery, and malignant sore throat, have been traced to the milk supply, has led the health officials of many large cities to undertake a complete control of the milk supply. In Boston, from 1907 to 1911, inclusive, there were five epidemics due to milk, causing 4,096 definite cases of disease. This number included, diphtheria, 72 cases; scarlet fever, 1,559 cases; typhoid fever, 400 cases, and malignant sore throat, 2,065 cases. This control of the milk supply has taken the form of fixed standards as to the cleanliness and general sanitation of the dairy, determined by inspection, the amount of sediment of the milk and the bacterial count.

Certified Milk.—In New York, where much of the source of the milk supply is remote, the health authorities have undertaken the pasteurization of all milk except one grade—A. In some places Milk Commissions, appointed from the members of the local Medical Society, give a certificate to dairies producing a particularly high grade of milk of a low bacterial count. If the milk maintains a bacterial count of less than 10,000 bacteria per cubic centimetre, it may have the stamp of the Commission and may be called *certified milk*. The value of this certification depends largely upon the efficiency of the Commission.

The cleanly handling of milk is absolutely essential since it

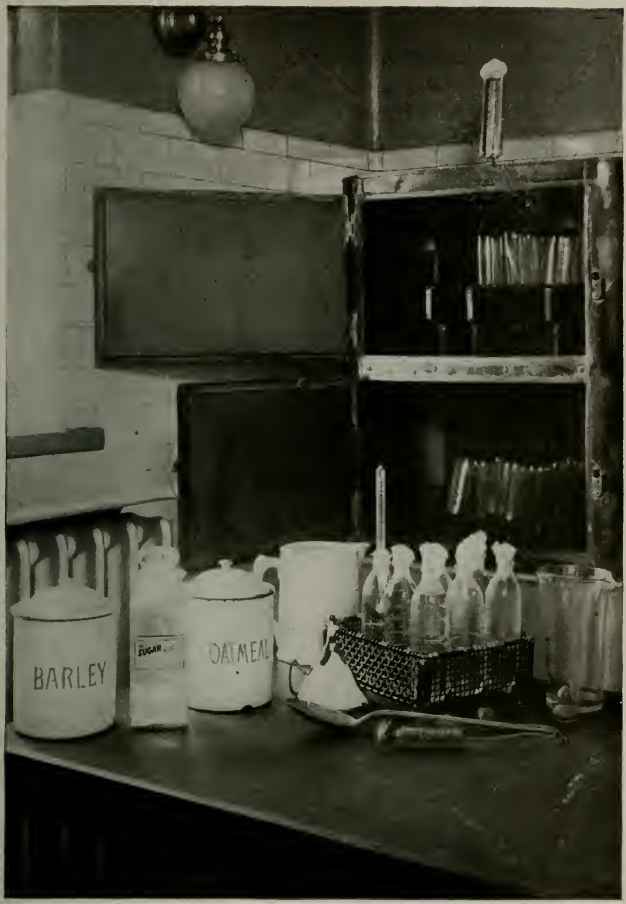

FIG. 54.—Ordinary utensils necessary in the preparation and pasteurization of milk.

has been shown that most milk epidemics are due to contamination from human sources.

That infected milk is a large factor in producing the increased mortality in infants during the hot summer months has been definitely established. Since the routine pasteurization of

Fig. 55.—Simple bottle rack.

milk has been practised, the mortality of infants in New York and other large cities has been much reduced.

The technic of pasteurizing the milk for infants is a simple one and requires only elementary knowledge and a few proper utensils (Fig. 54).

Care of Milk Bottles.—The proper number of bottles for the twenty-four-hour feedings should be provided. They should first be thoroughly washed and boiled. The milk should be prepared according to the prescribed formula and the proper amount poured in each bottle. Each bottle should then be stopped with a plug of sterile cotton and placed in a bottle rack (Fig. 55), or pasteurizer (Fig. 56). An extra (dummy) bottle filled with water should contain a dairy thermometer (Fig. 54). The bottles are then placed in a water bath and put on the stove until the temperature has reached 150° F., when the flame may be lowered,

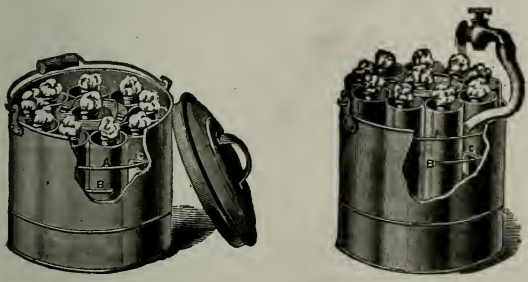

Fig. 56.—Freeman pasteurizer.

or turned out. They should be allowed to remain at that temperature for thirty minutes and then quickly cooled, preferably by running water, and then placed on ice until needed.

Before feeding, of course, the milk should be heated to the body temperature.

Thermos Bottles.—The use of thermos bottles to keep milk warm for the baby at night is a dangerous practice, as germs develop rapidly in milk at body temperature. All milk should be covered and away from the dust and flies.

The Ice-box.—Milk when placed in an ice-box with other food, such as vegetables, fruit, etc., readily absorbs the taste and odor, which renders it unpalatable, if not unsanitary (Fig. 57).

FIG. 57.—Improper manner of keeping milk in an ice-box. (Minnesota Dairy and Food Dept.)

A separate small ice-box should be provided, if possible, for the baby's milk. Such an one can be made at little expense.

Procure an ordinary box eighteen inches square with a lid;

put six inches of sawdust on the bottom; then place a tin can without cover twelve inches across and twelve inches deep in the centre of the box so that the upper edge is level with the upper edge of the box. Pack the space around the can with sawdust. Nail several thicknesses of cardboard or paper to the inside of the lid and the ice-box is complete (Fig. 58).

The following tables give the average percentage composition of cow's milk and mother's milk:

COW'S MILK

Proteins	3.0	to	3.5	per cent.
Fats	3.5	to	4.0	per cent.
Milk sugar			4.5	per cent.
Salts			0.75	per cent.
Water	87.0	to	88.0	per cent.

MOTHER'S MILK

Proteins	1.50	to	1.75	per cent.
Fats	3.50	to	4.0	per cent.
Milk sugar	6.5	to	7.0	per cent.
Salts	0.2			per cent.
Water	87.0	to	88.5	per cent.

From a comparison of the two tables it will be seen that the chief difference is in the amounts of proteid, sugar, and salts.

DIGESTIBILITY OF PROTEID AND FAT.—It was chiefly upon the quantity and character of the protein that the difficulty in feeding cow's milk to babies was formerly thought to depend. This idea has now been found to be fallacious and we now know that the fat of cow's milk is really more difficult of digestion than the proteid.

The chief difficulty with the proteid is due to its physical peculiarity in coagulating in dense curds in the stomach, thus rendering it difficult to pass the pylorus. It has been found that changing the character of the curd by diluting with gruels or by boiling overcomes this difficulty. The caloric [1] value of

[1] Calorie—the amount of heat required to raise the temperature of a litre of water one degree Centigrade.

ordinary cow's milk (Holstein) is practically the same as woman's milk, 19 to 21 per ounce, or 620 to 670 per quart.

Breeds of Cows.—There is, however, considerable difference in the milks of different breeds of cows. The Jerseys (Fig. 59) and Guernseys give a milk containing as high as 4 per cent. proteins, 5.5 per cent. of fats, and 4.5 to 5 per cent.

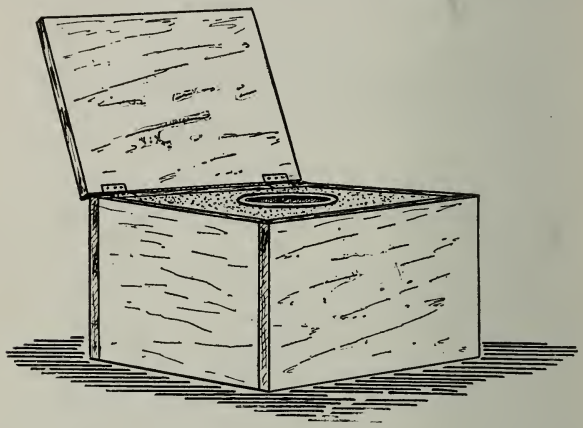

Fig. 58.—Small ice-box for the baby's milk, which can be made for less than one dollar.

of sugar, and having a caloric value of 800 to 850 calories per quart.

In selecting a milk for young infants, Holstein (Fig. 60), or ordinary grade cows should be preferred to the Jerseys or Guernseys.

Modification of Milk for Infants

It has been pretty well demonstrated that the average young infant will not tolerate the same amount of fat in cow's milk as is normally in mother's milk, 3.5 to 4 per cent. The proteid of cow's milk, which is double in quantity that of woman's milk,

FIG. 59.—First-prize Jersey herd, Canadian Industrial Exposition, 1914. (Owned by Mr. Geo. T. Slade, St. Paul, Minn.)

also frequently gives trouble, in a mechanical way, unless diluted or otherwise changed.

Percentage Modification of Milk.—The system of modifying milk which has been in general use in this country until recently was known as the "percentage method." The idea was to make from cow's milk a formula which approximated that of mothers' milk. To do this at all accurately was not an

Fig. 60.—A herd of Holstein cows. (Broadview Farm, St. Paul, Minn.)

easy task, and for the average mother it usually resulted in the giving of a much larger percentage of cream than was intended. It is yet a common experience to see infants getting the top from two quarts of milk in the day's feedings.

Simple Dilutions of Milk.—A simple and more uniform plan is to use simple dilutions of milk and add the necessary amount of the other ingredients in the form of sugar, starch, or fat.

Fig. 61.—The cleanest milk comes from cows in pasture.

Since mother's milk and cow's milk have the same food value, 670 per quart, it is apparent that if we dilute cow's milk with an equal quantity of water, the same quantity will have only one-half of the original food value.

The simple dilutions of ⅓, ½, ⅔ whole milk will usually be found to be tolerated at the proper ages. The necessary amount of sugar may usually be added to bring the sugar content up to 6 or 7 per cent.

For the preparation and use of the different milk mixtures used in artificial feeding the following list of utensils will be found necessary:

Two-quart porcelain pitcher.
Pint or quart graduate.
Glass funnel for filling the bottles.
Dairy thermometer.
Nursing bottles, the proper number for the day's feedings. (The bottles may be purchased by the dozen very cheaply.)
Rack for bottles.
Bottle cleaner.
Large pan for water bottle, or double boiler.
Gas stove.
Roll of sterilized absorbent cotton.

Nursing Bottles and Nipples

A simple cylindrical bottle with a large mouth, with a scale of ounces on the side, is the most practical, all things being taken into consideration. The shoulder is such that it can be readily cleaned; it is cheap, and of such size that the aggregate number, for the day's feedings, occupy a minimum of space in the ice-box. The small grooves in the neck of the bottle make the nipple non-collapsible.

Bottles such as Nos. 4, 5, 6, and 7 in Fig. 62, with glass or rubber tubes, are absolutely unsanitary. They are prohibited by law in some states, and should be in all. The "hygea"

bottle and nipple are satisfactory from the hygienic standpoint, but owing to the hardness of the nipple they are not as practical as the simpler and less expensive forms.

Nipples should be of the simple variety, preferably of dark rubber, and with openings as small as possible. Blind nipples may be purchased and the openings made the size desired by means of a red-hot needle. The size of the opening should be large enough to permit the milk to drop fast when the bottle is inverted, but not large enough to permit it to run in a stream.

FIG. 62.—Nursing bottles and nipples. No. 1 is simple and having no shoulder is easier to clean than No. 2. No. 3 is easily cleaned but the nipples are hard and they are more expensive than Nos. 1 and 2. Nos. 4, 5, 6, and 7 are absolutely bad and should never be used.

Nipples should rarely be boiled, as boiling destroys the rubber. They should be thoroughly washed after each nursing, with soap and running water, and should be turned inside out so that they are thoroughly clean. They should be kept clean and dry in a covered sterilized dish until needed.

Bottles should be filled with cold water at once after feedings, to prevent the milk from drying in them and rendering its removal difficult.

A matter of much more vital importance than the exact percentages is the proper amount of food for the baby's growth and development and one that it can digest and assimilate.

The following formulæ made from simple dilutions of milk will usually be tolerated by normal infants at different ages:

Age	No. of feedings	Oz. at feeding	Oz. milk	Oz. sugar	Oz. oatmeal or barley water	Oz. water	Oz. total	Calories per pound
Week:								
1	6	1 -1½	1-3	¾	..	8- 6	9	13
2	6	2	3-5	½	..	9- 7	12	25
3	6	2½-3	5-7	½	..	13-11	18	29
Month:								
1	6	3	7-9	¾	..	11- 9	18	40
2	6	4½	13	1	..	14	27	50
3	6	5	15	1½	15	..	30	44
4	5	6	18	1½	12	..	30	50
6	5	7	23	1½	12	..	35	45
8	5	8	28	1½	14	..	40	45
10	5	8	30	1	10	..	40	40
12	4	8	30	0	10	..	40	40

The foregoing formulæ are designed to serve as a guide, it being understood that many robust children will require more food than is prescribed for their ages.

It is a good rule to follow, to give the baby the least amount of food upon which it gains a proper amount weekly in weight and is otherwise well nourished.

The barley or oatmeal water is made by putting two tablespoons of the flour in one quart of water and boiling for one-half hour and straining through a fine sieve.

The sugar used may be either milk, cane or malt sugar, the cane sugar having the advantage over the other two of being cheaper.

The malt sugar has a slightly higher food value than the others, as it is absorbed without being changed. It is also more laxative than other forms. There is considerable difference in the bulk of the different sugars and flours, as will be seen in the following:

By weight	By measure
1 ounce cane sugar	= 1½ ounces
1 ounce Dextro Maltose	= 1¾ ounces
1 ounce milk sugar	= 1½ ounces
1 ounce browned wheat flower	= 2¼ ounces
1 ounce barley flour	= 2¼ ounces
1 ounce oatmeal	= 3 ounces
1 ounce malted milk	= 2 ounces

For caloric values of different food elements see page 128.

Mixed Feeding.

Babies who are artificially fed should begin to have some extra food after they are six months old, and if the food is sterilized they should begin having a little orange juice well diluted or other uncooked fruit juice as early as the second or third month, or even from the beginning.

The same rules for the mixed feeding of bottle babies may be applied as already has been described in the case of those fed on the breast.

The Stools in Artificially-fed Babies

The stools of babies fed on cow's milk have quite a different appearance than those fed upon the breast, and there are, in fact, other very essential differences in the character of the two.

The Color.—The color of the stools from cow's milk is a pale yellow and smoother and of a firmer consistency than breast milk stools. The color, however, is much modified by the addition of the different gruels and sugars. Malt sugar, for example, gives the stools a brownish tinge, as also does the addition of barley gruel, particularly if made from pearl barley.

The Odor.—The odor of the stools is also quite different from those of infants fed on breast milk. This is probably due to the difference in the character of the bacteria and to the larger amount of fatty acids present.

Reaction.—The normal breast milk stool is slightly acid in reaction, that of the artificially-fed being slightly alkaline.

Number During the Day.—There should be at least one good movement of the bowels daily, and preferably two.

There is a marked tendency to constipation in babies fed on cow's milk.

Normal stools are smooth and of a salve-like consistency.

Fat Stools.—Stools which are hard, brittle, and pale in color, with a foul odor, indicate the presence of an abnormal amount of fat in the form of soap. Such a condition demands a radical change in food, usually a reduction or elimination of the fat and the substitution of a sufficient amount of carbohydrates to compensate for the caloric loss. The small white curds mixed in with green is another form of fatty soap stool.

The loose acid stool, which burns the skin about the buttocks, usually points to an excess of sugar or other carbohydrate in the food.

The large curds the size of a pea, or bean, mixed in with a stool are usually made up of masses of undigested casein with which is often incorporated considerable fat. They do not appear in the stool if the milk has been boiled.

Green Stools.—Green stools, if persistent, in artificially-fed babies, always mean an excess of some element in the food. It should be regarded as serious and the physician's attention should always be called to the condition.

Black Stools Indicating Blood.—Black, tarry stools, recurring in infants after the first week when the meconium has passed, indicate the presence of blood, unless iron or bismuth is being given.

Stool Analysis.—A specimen of the stool should always be retained for examination by the physician. An analysis of the stool is frequently the only means by which a diagnosis can be arrived at, or the errors in the diet corrected. Constipation in artificially-fed babies is frequently a serious problem and requires a careful study of the individual case.

If the stools are well digested and of a proper consistency, the question of voluntary evacuation can always be met successfully by regular habits, and the elimination of cathartics,

injections, and glycerine suppositories. Under the conditions mentioned, when the stools are of normal consistency, the bowel will empty itself if left alone. A soap stick may sometimes be resorted to, to produce the necessary effort on the part of the baby. This should always be done at the same time and the baby held in the proper position so that it can use its muscles to the best advantage. At six months a baby may be put regularly on the chair, being, of course, properly supported. It will soon learn to know the significance of this and will then empty the bowel only at these times. The back should be supported in the upright position by the nurse and the child never allowed to sit alone until it can raise and support itself.

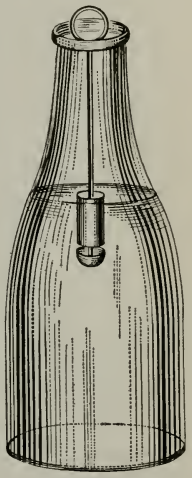

Fig. 63.— Milk bottle and cream dipper.

When the stools are hard, so that great masses are packed in the rectum, the food will have to be modified.

The hard condition of the stools may sometimes be overcome by substituting oatmeal for barley gruel and giving Dextro Maltose instead of milk sugar or cane sugar.

Microscopic Examination. — The hard, chalky stools are frequently due to an excess of fatty soaps. By adding a drop of glacial acetic acid to a little of the stool and mixing it thoroughly on a glass slide, it will frequently be found that these stools are made up largely of fat which may be seen under the microscope in the form of feathery crystals.

This condition of the stools is usually accompanied by a strongly ammoniacal urine, which will be readily noted whenever the diaper is changed.

Under such conditions the fat must be largely removed from the milk (Fig. 63) and Dextro Maltose and starch added as a substitute to increase the caloric value of the food.

Fruit Pulp for Constipation.—After a baby is five or six months old it may have some fruit juice, such as orange juice or prune juice, or even the prune or orange pulp which has been put through a sieve. Babies who are habitually constipated should have a mixed diet as early as possible and the milk materially reduced.

Proper Use of Enemas and Mild Laxatives.—Occasionally mild laxatives, such as milk of magnesia, or an enema, may be used as a temporary measure, always keeping in mind the fact that such things are simply palliative and should be gradually discontinued.

If a baby is thriving properly, the fact that it is somewhat constipated should not be taken too seriously, and must simply be considered as one of the unfortunate features of artificial feeding.

Over-feeding.

Many of the digestive disturbances from which infants suffer are due to over-feeding. There is a great tendency on the part of people generally to over-feed their children.

There is always a certain rivalry among mothers to see who can produce the fattest baby. They should be taught that a normal gain in weight is what is to be sought and that the fat babies are often rhachitic, and that babies who are over-fed, even if apparently well, are almost sure to have serious digestive disturbances during the hot weather.

It is not infrequent that children who are over-fed suddenly cease to gain in weight and begin to lose steadily. If the over-feeding is persisted in they gradually develop a condition of intoxication and intolerance for food. Many of the severe cases of atrophy or marasmus have their beginning in over-feeding.

It frequently happens where infants have been over-fed and have ceased to gain in weight, that a proper gain is re-established as soon as the amount of food has been properly reduced (paradoxical gain in weight).

It is in this connection that a knowledge of caloric values becomes of great value (page 128).

Infants who have been greatly over-fed with some particular element of the food, for example with fat or sugar, are almost always intolerant to that element for a considerable time, so that it will usually be necessary to eliminate it to a large extent from the diet.

For example, if a baby has been fed on food rich in fat, and developed a severe gastro-intestinal disturbance as a result, the logical food for some weeks would be one with a low fat content, such as buttermilk or malt soup (page 132). If, on the other hand, it had been fed on one of the patent foods with a high sugar content, the logical food would be a simple dilution of milk and water without the addition of any sugar.

The results of over-feeding are so many, and the conditions so complicated, that only the most careful analysis will sometimes discover the way to a proper recovery.

COLIC

Colic in artificially-fed infants, as well as those fed on the breast, is usually due to over-feeding. In bottle-fed infants the indigestion is liable to be due to some particular element in the food. This can usually be determined by a proper analysis of the stools.

If the stools are bad in character, loose, green, or curdy, it is probable that the crying is due to indigestion (colic). If the stools are good and there is no vomiting, and the baby is gaining in weight, the crying is due, in all probability, to its being spoiled.

Gas on the Stomach.—The constant solicitude of nurses because the baby has "gas on the stomach" is unwarranted. All bottle-fed babies have gas in the stomach. They swallow it with their meals in the form of air. If the baby is gently raised in the sitting posture the gas will usually "come up." This may be done in the middle of a feeding if the stomach seems unusually distended.

Carrying infants because they have colic should never be allowed. If they really have colic, the cause of the colic should be removed. Babies who are carried and rocked will cry when they have colic, and also when they are well. Occasionally severe attacks of colic may be relieved by an enema.

Babies should be fed while they are lying on their beds, the upper part of the body being somewhat elevated by means of a properly graduated hair pillow. The baby should be turned slightly on the right side, as it has been found that the stomach empties itself sooner in that position.

The bottle should always be held by the nurse, or attendant, until it is empty (Figs. 64 and 65). From fifteen to twenty minutes should be occupied with the meal.

Vomiting

Regurgitation of Food from Pressure and Position.—Owing to the relaxed condition of the cardiac opening of the stomach, regurgitation of food occurs very easily in infants. If pressure is made over the stomach of an infant after a meal it will regurgitate some of the food, or if its head is lower than its heels, some of the milk will run out of the stomach, as it would from an inverted bottle without a cork. Real *vomiting,* produced by a spasm of the stomach and co-ordinate fixation of the diaphragm by which the food comes out with a gush, is usually due to a disordered condition of the stomach from over-feeding or to pylorospasm. The over-feeding with fat is a common source of vomiting under these conditions. The vomitus is usually very sour and has the odor of fatty acids.

If babies vomit food up to the time for the next meal, the stomach should be given a rest for several meals, and boiled water, or barley water, given. The milk should be reduced, particularly the fat, and the intervals between feedings increased to four hours, with not to exceed five feedings in twenty-four hours.

Pylorospasm.—If the vomiting continues, and particularly

FIG. 64.—The bottle should be held by the nurse or attendant until it is empty (The right way.)

FIG. 65.—The wrong way of feeding the baby.

if it is projectile in character, sometimes coming through the nose with force, a pylorospasm must be thought of, and the physician's attention called to the condition. These cases lose weight rapidly, as practically no food passes the small end of the stomach. After a meal, stomach waves can usually be seen extending from left to right. Usually several of these waves are to be seen at the same time, one following the other.

Pyloric Stenosis.—In some of the persistent cases a stenosis, or obstruction, in the form of a small tumor, varying in size from a filbert to a hickory-nut, is found at the pylorus.

The treatment in these cases will differ much under different circumstances. Many of them occur in breast-fed babies. The intervals between feedings should be as long as possible—four or five hours. It is frequently necessary to pump the milk from the breasts and remove the cream, or, if fed on cow's milk, the cream should be removed. Expressing the milk from the breasts and mixing it with a thoroughly cooked cereal, such as farina, the mixture to have the consistency of very thick gruel, often results in a marked diminution of the vomiting.

Irrigation of the stomach at least daily is often beneficial.

These cases should be kept very quiet and absolutely free from excitement, as there is a large nervous element to be considered. Careful weighings should be made daily. If, in spite of everything, the baby still vomits much, and is losing steadily in weight, an operation by a skilled surgeon will become imperative. Too many of these cases are allowed to go until they are in extremis before operation is resorted to, and then usually without result.

RECURRENT VOMITING—CYCLIC VOMITING

(Intermittent Vomiting)

Certain children after two years of age, particularly those of a neurotic temperament, have periodic attacks of vomiting which frequently have no apparent bearing on the condition of the stomach or on the character of the food taken.

There is no doubt that attacks are frequently precipitated by indiscretion in food, but they frequently occur when they cannot be accounted for. The attacks are usually preceded by a few hours of lassitude; the tongue may or may not be coated.

Acetone in the Urine and Breath.—The breath usually has a sweetish odor due to acetone and the urine contains acetone in an abnormal amount. I am aware that some authorities, chiefly European, claim that the acetone is simply a result of starvation. I have, however, seen it present from the beginning and when there was no starvation period. The vomiting may persist at intervals for several days, the child being unable to retain even small amounts of water.

Under such conditions water should be furnished by rectal injections of normal salt, introduced slowly, or by the drop method. It is not uncommon that after the vomiting has continued for several hours, the vomitus, which is usually mucus and bile, may contain some blood. Under such conditions no food should be given by the mouth until the vomiting has ceased. After the attack is over these children will gorge themselves if allowed to. They should not be starved, but allowed to return gradually to a plain prescribed diet. A careful regulation of the diet, sometimes with the elimination of milk and eggs, is effective in lessening the attacks. The condition is not unlike what is known as " sick headache " in adults, and there may be a history of migraine in the parents.

The Caloric Values of Milk Mixtures and Their Application to Feeding

The caloric values of the different food elements have been carefully worked out by Rubner and Huebner, so that all that is necessary to determine the total value of any mixture is to know the amounts of each ingredient in ounces or grammes and apply the prescribed value.

The following are the approximate caloric values for the following articles of diet which go to make up the usual milk mixtures:

Food	Caloric value per ounce
Whole milk (3½–4 per cent. fat)	23
Skimmed milk (½ per cent. fat)	13
Buttermilk (½ per cent. fat)	13
Gravity cream (16 per cent. fat)	56
Sugar (by measure)	80; by weight, 120
Flour, wheat, or barley (measure)	55; by weight, 120
Oatmeal (measure)	40; by weight, 120

Suppose we have a milk mixture of 30 ounces, this being the total food in twenty-four hours.

The mixture is made up of ⅔ milk and ⅓ barley gruel and 1 ounce sugar (by measure).

The milk contained in the mixture would therefore be ⅔ of 30, or 20 ounces.

The oatmeal gruel in the mixture would be 10 ounces.

And 1 ounce of sugar.

The milk has a caloric value of 23 per ounce; therefore, the value of the milk is 20 times 23, or 460 calories.

The 1 ounce of sugar, by measure, has a value of 80 calories. How shall we determine the value of the gruel?

We find on inquiry, the pint of gruel contained ½ ounce, by measure, of barley flour, and that the pint was allowed to boil down to 10 ounces. The gruel then contains all the barley, and has a caloric value of 27½, *i.e.*, ½ of 55.

The total caloric value of the mixture is therefore:

20	ounces whole milk	460 calories.
½	ounce flour (by measure)	27 calories.
1	ounce sugar (by measure)	80 calories.
	Total	567 calories.

If the weight of the baby is 16 pounds, and its needs according to rule are 50 calories per pound, its total needs are 800 calories.

It is getting 567 calories, therefore, according to Huebner, it is under-fed by the difference between 800 and 567, or by 233 calories.

If in addition to the above formula the mixture contains 1 ounce of ordinary cream, skimmed from the top of the bottle, the value of the food would be increased by 56 calories. The mixture would now have a value of 567 plus 56 or 623 calories. There still being a deficiency of food this would have to be made up by a still further increase of some or all of the ingredients as indicated by the tolerance.

Special Preparations of Milk and the Indications for Their Use

Under certain conditions it will be found necessary to use special preparations of milk other than the regular milk mixtures, which contain all of the elements of the milk.

For example, there are children who under certain conditions are unable to tolerate the fat of cow's milk. Such an intolerance may be manifested by vomiting, or by diarrhœa with green curdy stools, or the stools may be hard, dry, and chalky, with the ammoniacal urine already described.

Skimmed Milk.—It will be necessary in such cases, therefore, to give a food low in fat, or sometimes fat free. Cow's milk which has been allowed to stand for five or six hours and then carefully skimmed still contains about 0.5 per cent. of fat.

Separated Milk.—Milk which has been put through a properly adjusted separator may be practically fat free.

Ordinary buttermilk (the by-product from the making of butter) has a fat content of about 0.5 per cent.

Percentage of Fat in Gruels.—Most of the cereal gruels, such as oatmeal, barley, rice, wheat, flour, arrowroot, are for all practical purposes fat free. However, they contain such a small amount of proteid and such a large percentage of starch that they cannot be utilized alone for any great length of time.

Buttermilk

As a diet for infants where little fat is required, buttermilk has enjoyed a reputation among Europeans for many centuries.

Buttermilk is made by souring milk or cream by means of

lactic acid bacilli, after which the butter fat is removed by churning. When fresh buttermilk cannot be procured from the dairies it can readily be made at home by churning soured cream in a small glass churn, which can be purchased at any department store.

The percentage composition of buttermilk is as follows:

Proteid	2	to 3	per cent.
Fat	½	to 1	per cent.
Sugar	3	to 3½	per cent.
Its acidity is about	0.5		

Caloric value, 11 per ounce, or 350 per quart.

In the process of souring, the calcium casein is converted into lacto-casein. The sugar, by the process of fermentation, is reduced to about three and one-half per cent. In order to increase the caloric value of buttermilk it is usually prepared by adding a certain amount of sugar and flour. The mixture is then brought to a boil.

The following is the author's modification of Baginsky's formula:[2]

Buttermilk	1 quart.
Wheat flour (browned) ..	1 to 2 tablespoons.
Sugar (cane)	2 to 4 tablespoons.

The flour is first mixed thoroughly in a cup with a little buttermilk and then added to the buttermilk. It is then put on the fire and brought slowly to the boil, stirring constantly in order to prevent it from curdling.

After it has boiled three minutes the sugar is added and the mixture again brought to the boil. It is then removed and cooled rapidly and kept on ice until needed.

This preparation has a caloric value of from 500 to 650 per quart, depending on the amount of sugar and starch added.

After the preparation has stood for a couple of hours the

[2] "Buttermilk as an Infant Food," Ramsey, Walter R., St. Paul Medical Journal, January, 1904.

starch settles to the bottom and carries with it the casein, which has been divided into fine particles.

The buttermilk formula may be given in the same amounts as other milk mixtures. In young infants it may be diluted with water as required for the individual case. Other preparations of sour milk are in quite general use. They are made by souring whole milk by means of lactic acid bacilli, or the bacillus bulgaricus. If fat-free milk is desired skimmed milk may be substituted for whole milk.

Buttermilk and sour milks, such as matzoon, kephyr, or koumiss, made from the milk of the cow, goat, mare, or ass, are perfectly wholesome foods not only for sick children, but for healthy ones as well. All children should be taught to like buttermilk and should have it at intervals during their whole lifetime. According to some authorities, the good age to which many of the people in the Eastern countries (Bulgaria) attain, is primarily due to their constant use of sour milk.

WHEY PREPARATIONS

Whey is made by curdling whole milk, or skimmed milk, with junket tablets, or other preparations of rennet, such as Fairchild's essence of pepsin.

The prescribed number of tablets, or essence of pepsin, is added to a quart of milk and the temperature maintained at about 100° F. until the milk is curdled. The liquid portion of the milk (whey) is then removed by straining it through a cheese cloth, or fine sieve under pressure. One quart of milk will yield about twenty ounces of whey.

The percentage analysis of whey is approximately as follows:

Protein	0.75	to 1.0	per cent.
Fat	0.01	to 0.25	per cent.
Sugar	4.	to 4.50	per cent.
Salts	0.4	to 0.6	per cent.

Owing to the fact that whey is practically fat free, it may be modified as required for the individual case, sugar or starch being added as indicated.

KELLER'S MALT SOUP

This preparation was designed by Keller particularly for the cases which he termed "Fettnährschaden," a condition resulting from intolerance to the fat of cow's milk. It is not fat free, but contains much less fat, 1 per cent., than the average milk mixtures, but a large percentage of carbohydrate.

Malt soup is made in the following manner:

Cold water	20 ounces.	Wheat flour	1½ ounces.
Whole milk	11 ounces.	Malt soup extract.	3 ounces.

Mix flour and water together and bring to a boil. Next add the malt extract and bring to a boil. Lastly add the milk, stirring constantly, and bring to a boil a third time. Cool quickly in running water and place on ice until needed.

The mixture contains approximately 2 per cent. albuminoids, 1.2 per cent. fat, and about 12 per cent. carbohydrates.

This preparation, when made according to the above formula, has a caloric value of about 700 per quart.

In many cases I have found that children could not tolerate as much malt extract as given in this formula without having diarrhœa. It is better to begin with a half ounce and gradually increase, if it can be tolerated, to the full amount. If this food is given for any length of time some orange juice should be given to prevent scurvy. Dr. Alfred Hess has recently demonstrated that scurvy is frequent in infants fed exclusively for long periods on malt soup. He believes the alkali in the food is the exciting cause.

ALBUMIN OR CASEIN MILK

Another special preparation of milk, which has been used with good results in certain forms of intestinal indigestion and malnutrition, is known in this country by various names, as albumin milk or casein milk. It was described by Finkelstein, of Berlin, under the name of Eiweis milk. It contains all the fat and casein of the milk, but the salts, sugar, and soluble albumin are eliminated. As soon as possible sugar or other carbohydrates are again added.

Albumin milk is prepared in the following manner:

To one quart of whole milk add one tablespoon of Fairchild's essence of pepsin and warm to 100° F. for about one-half hour, or until the milk is thoroughly curdled. The "curds and whey" are then poured on several thicknesses of cheese cloth and allowed to drain for one-half hour. The whey which drains off is rejected.

The curd is then rubbed through a fine sieve with a spoon, gradually adding boiled water to the amount of one pint during the process. The curds should be put through several times, if necessary, to make a smooth mixture. This gives a mechanical solution of the curds of a quart of milk in one pint of water. A pint of fresh buttermilk is then added and the mixture thoroughly stirred. It should be put directly on ice and kept there until needed.

Albumin milk has a caloric value of from 430 to 500 per quart, depending upon the percentage of cream in the curd.

In specific cases albumin milk is of great value. Many of the failures in its use can be attributed to the fact that it is frequently improperly made.

PEPTONIZED MILK OR PREDIGESTED MILK

By peptonized milk the proteids are changed to peptones. It must be remembered that if milk is allowed to peptonize beyond a certain time it becomes bitter to the taste.

Peptonized milk has a place in the feeding of feeble infants and in older children where the digestive powers have been much reduced by illness.

The peptonizing of milk should not be kept up beyond the time when the digestive functions have been re-established.

To one pint fresh cow's milk add four ounces boiled water, two teaspoons of pancreatic extract, and fifteen grains of Sod. bicarbonate. Allow to stand for ten to twenty minutes at a temperature of 105° F. Then quickly bring to the boiling point in order to destroy the ferment and prevent further digestion. If

the milk is to be used at once the boiling is unnecessary. If it is desired to further peptonize the milk it is only necessary to allow it to stand longer at the proper temperature.

The peptonizing powder is put up by Fairchild in tubes of the proper size to peptonize one pint of milk. They may be purchased one dozen in a box at any drug store. If the milk is boiled some uncooked fruit juice should be given.

THE PATENT FOODS

The enormous growth in the manufacture and sale of baby foods in this country adds an interesting chapter to the subject of infant feeding.

That some of these foods, especially those which are designed only to modify cow's milk, have in the past served, and are still serving, a useful purpose there can be no doubt.

One of the great evils for which the manufacturers of most of the patent foods are responsible is the discouragement to breast-feeding, which has resulted from the wide-spread advertisements with which every home is flooded long before the prospective baby arrives. The ease with which these foods can be prepared, together with the picture of a fat, although usually rhachitic, baby, is only one of the allurements held out to the prospective mother. Such foods as Malted Milk and Nestle's Food, although they have a limited use, should never be used as an exclusive food for infants. They are low in fat and high in carbohydrates, and although the proteid is present in fair amount, the fact that a large percentage of the protein is of vegetable origin makes it necessary to discount this element also. According to Wachenheim, a dilution of five ounces of Nestle's Food in one quart of water gives the following percentage analysis:

Proteins	2.1 per cent.
Fats	1.0 per cent.
Carbohydrates	14.7 per cent.
Salts	0.3 per cent.
Water	81.9 per cent.

The caloric value of this mixture is about 750 per quart.

The frequency with which children fed upon these foods suffer from rickets should be a sufficient reason to discourage their continuous use, unless combined with a proper amount of fat and proteid.

These foods may sometimes be used to advantage for a brief period when children are recovering from an acute intestinal disturbance due to over-feeding with fat. Malted milk may be given in small amounts to supplement breast-feeding, especially if the mother has a scant supply but rich in fat.

When it becomes necessary to increase the artificial food, cow's milk should always be given in the proper proportion.

CONDENSED MILK

There is the same objection to condensed milk as to the other proprietary foods, that is, the relatively low fat content and the high percentage of sugar. At the present time, however, several new forms of condensed milk are on the market.

Evaporated milk is produced by simply evaporating a portion of the water of the milk, thereby reducing its volume. The process of evaporation may be carried further, so that all the water is evaporated, leaving the solids in the form of a milk powder. Such a powder is now being manufactured containing all of the elements of the milk. It is only necessary to add the necessary amount of water to reproduce the original milk.

Scurvy or Barlow's Disease.—In addition to the probability of developing rickets on the patent foods, there is also the danger of scorbutus, or scurvy (Barlow's disease). This disease probably results from the fact that these foods are sterilized. Some uncooked fruit juice, such as orange juice, should be given to infants who are being fed on any sterilized food.

Feeding During the Second Year

By the end of the first year the baby has been weaned from the breast. It has, however, since the seventh or eighth month

had other food in increasing amounts, the breast milk having been gradually replaced by cow's milk.

Quantity of Milk Allowed.—The question daily arises how much cow's milk should a baby have during the second year, and is cow's milk necessary to the proper growth and development of a child after the first year?

It is fair to assume that cow's milk was not primarily designed for babies or children, but for calves, just as a mother's milk is designed for the use of her own baby.

Undoubtedly, then, children could get on very well if they did not have any milk after they were weaned.

There is no doubt that milk is usually an important addition to the dietary of the average child. There is no doubt, however, that its use in older children has been much overrated.

It will be found that infants who are fed on cow's milk practically to the exclusion of other foods are usually pale, flabby and poorly nourished generally.

There are some children who are extremely intolerant to cow's milk and are badly nourished until it is discontinued and they are put upon a good, round mixed diet.

When children have been fed upon cow's milk during the first year and have had serious digestive disturbance, particularly that class who have suffered from the condition described by Czerny-Keller as Fettnährschaden, the milk can be largely discontinued at one year to great advantage, and other food substituted.

Unless children tolerate milk particularly well, the daily quantity should be cut to considerably below a quart after the first year, and sometimes earlier.

The persistent constipation from which many children suffer during the first year will frequently be much relieved when the amount of milk can be greatly reduced.

Sweets.—The giving of sweets to children in the form of candy, cookies, etc., between their meals, is to be severely condemned. If children are allowed sweets between their meals, or in any quantity at their meals, they will not eat the proper amount

of plain food, such as vegetables, meat, bread and butter, etc. Whatever sweets are given should come after the meal as a dessert. It must be distinctly understood that the plain food must be eaten first, or there will be no dessert.

Eggs.—Another article of diet which is much overrated, particularly for young children, is eggs.

Some children, and particularly those of the exudative type, are intolerant to eggs. It is not uncommon to have a severe urticaria (hives) follow promptly the giving of an egg to a young child. When eggs are well tolerated they may be given after the eighteenth month, one every other day.

Many children have an idiosyncrasy also to such foods as strawberries and shell fish.

Before a new food is given in any considerable amount it should be tried in small quantities to see whether it will be tolerated.

Alcoholic drinks, tea and coffee should never be given to children.

Intervals for Meals.—During the second year four meals will usually be sufficient, given at four-hour intervals. Up until the eighteenth month, or until the baby takes a good amount of solid food at a meal, some food may have to be given at ten o'clock P.M., otherwise the baby will wake up very early in the morning. After ten o'clock if the baby wakens it should be changed, if soiled, and given only a little water, but no food.

The following diet is appropriate for the second year. The bottle should now be discontinued, the baby having gradually been taught to drink from a cup:

6 A.M.: Two tablespoons of thoroughly cooked cereal, such as oatmeal, cream of wheat, or farina, with some of the milk poured over it and a trifle of sugar. Six to eight ounces of milk. If it is more convenient at this meal, a piece or two of toast soaked up with milk may be given instead of the cereal, which may be given at ten o'clock.

10 A.M.: One or two pieces of zwiebach soaked up with some of the milk, six ounces of milk plus two ounces of barley or oatmeal gruel.

2 P.M.: Eight ounces good meat stock with some unpolished rice and one of the following vegetables: carrots, spinach, peas, beans, celery, asparagus, all thoroughly cooked and put through a sieve and having the consistency of purée. After eighteen months, scraped meat, one-half to one tablespoon, may be given instead of the meat juices. The meat should first be boiled and then scraped or finely ground. For dessert: apple-sauce, prune pulp, or other stewed fruit (mashed).

6 P.M.: Milk toast, bread and milk, or cooked cereal, such as cream of wheat, farina, arrowroot, rice. Six or eight ounces of milk.

All milk should be pasteurized or boiled for 1–2 minutes.

Diet After the Second Year

After a child is two years old it should have but three meals daily, and a little lunch in the middle of the forenoon and afternoon, if it is hungry, and it is found that such a lunch does not destroy the appetite for the regular meal.

It is well, so far as possible, to make the meal times correspond with those of the family, as the constant preparation of food is liable to cause trouble in the kitchen.

7 A.M.: Two tablespoons well cooked cereal, oatmeal, cream of wheat, or farina, with some milk and very little sugar. Ready prepared malted foods are apt to destroy the appetite for the plain foods and should therefore be avoided. Soft egg poached or coddled, every other day, unless contraindicated, or two slices of lean, crisp bacon every other day when the egg is not given. Graham bread and butter. Cup of milk or weak cocoa.

12 M.: Purée. Mashed or baked potato. Scraped, or ground meat, an amount equal to a small lamb chop. One of the following vegetables: carrots, spinach, peas, beans, stewed celery, squash, asparagus tips, all well cooked and finely mashed. Well cooked rice, macaroni, bread and butter.

For dessert: baked apple, apple-sauce, stewed prunes, stewed peaches or pears are the most dependable, or some simple pudding, as sago, tapioca, or custard, may be given. Pineapple and other uncooked fruits, unless mashed, are likely to be swallowed without proper mastication and often produce gastric disturbance.

3 P.M.: If hungry, and it is found that it does not interfere with supper, a piece of zweiback or a plain cracker may be permitted.

5.30 P.M.: Milk toast, cereal, bread and butter, custard, bread pudding, stewed fruit. Milk.

The following articles of diet are generally forbidden to young children:

Meats.—Pork, with the exception of crisp bacon, corned beef, salted fish, and fried meat generally.

Vegetables.—Fried vegetables generally, cabbage, raw onions, radishes, cucumbers, raw tomatoes, green corn.

Bread and Pastry.—Hot bread and rolls. All cake and candy, except the simplest kinds, and then only in small amount as dessert, after the meal.

Drinks.—Tea and coffee, and all beverages containing alcohol.

Discipline in the Feeding of Children

From the first, infants should have regular times for their meals.

Children should not be consulted about what they want to eat. If they are allowed to choose their own diet, they will naturally choose what appeals most to their taste, without regard to digestibility or food value.

It is perfectly foolish to say that a child will not eat this or that food. A child will eat any wholesome food which is put before it, if it is hungry enough.

It is fatal to discipline, if a child is allowed to refuse some particular food and cry until he gets what he wants.

Children must be given the proper food, and if they are not hungry enough to eat it, a period of starvation for a couple of meals will add an excellent sauce, after which the same food will be eaten with relish.

Children who are permitted to pick and choose their meals are a nuisance throughout life, both to themselves and every one with whom they come in contact.

Poor Appetite.—There is no doubt that some children are much more difficult to feed than others. In other words, there are "good feeders" and "bad feeders." Some children, usually nervous and badly nourished from infancy, have a small tolerance for food and after eating a small amount are satisfied. Their appetites are capricious and they usually crave just the

things they should not have: sweets and highly seasoned food. It is a great mistake to cater to the appetites of such children, for, of all children, they especially should have the plain nourishing food, with a practical elimination of sweets. When children are unduly excited they should not be forced to eat, as they will usually suffer from an attack of indigestion as a result.

School Children.—The diet of school children should be carefully watched. Unless careful discipline as to hours for going to bed and rising in the morning is strictly enforced, children, for fear of being late for school or the play, are likely to go off without sufficient breakfast, and that which they do eat is usually improperly masticated. At noon, the time is just long enough to be able to repeat the program of the morning. Many children take their lunch to school and eat it cold, the food often being badly chosen for the needs of a growing child.

The result is that such children are often poorly nourished, nervous, and are apt to break down physically and nervously. The question of diet for school children offers a large and important field for the social worker and school nurse, and one in which proper knowledge and effort will be well rewarded by the results.

CHAPTER XIII

PUBERTY

Puberty is the transition period between childhood and adolescence. The age of puberty begins earlier in girls than in boys, the average for girls being 13 years and for boys 15 years.

As this time approaches the child shows evidence of change, both physically and mentally. Instead of the tom-boy girl, who romped with boys and girls alike, we begin to notice a reticence and discrimination of sex. In girls, the breasts begin to develop, and a growth of hair appears under the arms and about the genitals. Menstruation begins usually from the 13–14th year, occasionally as early as the 12th.

The first evidence of the approach of adolescence in boys is often a change in the quality of the voice, and at the same time there is a growth of hair under the arms and about the genitals.

During this time there is liable to be a marked instability of the nervous system. Children are prone to be irritable and there is a greater tendency during this time to nervous affections. Girls frequently suffer from anæmia.

The age of puberty should be considered one of the critical periods in the life of the individual.

During this period children should not be crowded with their studies, and if the general health is below par the child should be taken out of school for a time and sent to the country, and sometimes away from the other members of the family.

Only plain, nutritious food should be permitted.

Many children are prone to sit about and read sentimental novels, or frequent morbid picture shows, when they should be playing out of doors. This, of course, should be discouraged, and the child should be kept interested in out-of-door pursuits.

which will tend to develop both the physical and moral side of his or her nature.

A proper amount of intelligent supervision during this period of a child's life will be repaid many fold.

Painful and irregular menstruation in girls should always be brought to the attention of the physician, as it is frequently due to a simple secondary anæmia, which can usually be readily corrected. Under no circumstances should local examinations or treatment be permitted except for urgent medical indications.

CHAPTER XIV

UNDER-NOURISHED CHILDREN

Some children are delicate from birth. They often inherit a poor constitution from the father or mother, or, owing to some illness of the mother, the baby is improperly nourished and may be born prematurely, or, if at full term, much under weight and lacking in vitality. The milk supply under such conditions is liable to be lacking in quantity and quality and should be supplemented by extra feeding.

It is in such cases as these that the prenatal care of mother and child would avail much. Many of the delicate children, however, are normal at birth, and their subsequent delicate condition can be attributed to improper feeding. Many of them are fed upon one of the patent foods and suffer from rickets as a result.

Such children are pale, thin, with poorly developed chests, frequently of the phthisical variety, or showing the effects of early rickets. Not infrequently the glands in the neck are larger than normal. These children are easily fatigued, lack energy, eat badly and with a capricious appetite. They are usually of an unstable disposition, frequently spoiled, and are in constant trouble with other members of the family as a result. Examination may reveal no definite diseased condition. As they grow older and go to school they frequently remain under-weight. It is often difficult to induce them to eat a sufficient amount of plain food to maintain their weight. A strict routine with a period of rest for an hour or so in the middle of the day is often necessary.

If anything worth while is to be done for this class of children it must be by intelligent, skilful handling.

Such children should be taken away from the family for a

period, preferably into the country, on a farm. One must be careful, however, to choose a boarding-place where fresh meat, vegetables, eggs, milk, and fruit may be procured, and where they

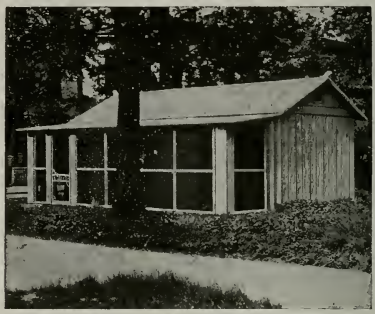

Fig. 66.—Screened house and tent.

can be properly prepared, as there is no place in the world where good food is so often spoiled in the cooking as on the farm.

Where the chest is under-developed, as it generally is in these cases, systematic deep breathing, combined with proper muscular exercises, will do much to correct the condition. Proper posture

while sitting, standing, and walking should be insisted upon.

A great effort should be made to get such children vitally interested in some pursuit which requires much walking and climbing, as, for example, the study of birds and their nests, or the collection of all the varieties of wild flowers in the vicinity.

It is wonderful what a difference it makes in one's attitude toward life, if one does a thing voluntarily, instead of being coaxed or driven.

Many of these children, and particularly the girls, suffer from a general ptosis of all the abdominal organs. This is a result of improper support from the ligaments, and, unless corrected by proper posture and exercise, it frequently leads to serious disturbance in later life.

These children should sleep out of doors the entire summer, and winter also, when the weather is not too severe (Fig. 66). The windows should always be sufficiently open to keep the air thoroughly fresh.

Cod-liver oil is of undoubted advantage in some cases, but if the digestion is disturbed as a result, it does more harm than good.

CHAPTER XV

DISEASES OF NUTRITION

The wasting diseases of infants are acute or chronic. The terms "inanition," "malnutrition," and "marasmus" are usually used to designate different stages of the same condition.

Acute inanition, or acute atrophy, is usually due to insufficient fluid being supplied the tissues, or to sudden loss of fluid, or to both combined.

A common cause of acute simple atrophy is insufficient food. It is not infrequently seen in breast-fed infants where the milk is insufficient in quantity. The rapid loss in weight in babies suffering from pylorospasm or pyloric stenosis, is an excellent example of acute inanition or atrophy.

Effects of Bad Feeding.—Infants who are badly fed, particularly on high fat mixtures of cow's milk, not infrequently suffer such damage to the digestive apparatus that, in spite of fairly large amounts of food, they continue to lose weight until such an extreme degree of emaciation is reached that death often results, apparently from starvation (Figs. 67 and 68).

Inherited Weakness.—Many of these children are born under unfavorable conditions, the parents are not vigorous and may be suffering from the effects of latent tuberculosis or syphilis. At autopsy some of these infants are found to have tuberculosis. In some, ulcers of the duodenum are found, but whether as cause or effect is not yet known.

Prognosis.—In the acute form, the prognosis is usually good when due to simple starvation, and all that is required to bring about a cure is to supply a proper amount of breast milk. Those due to obstruction at the pylorus will require the appropriate treatment, either medical or surgical. This has been described under "Vomiting."

FIG. 67

FIG. 68.

FIG. 67.—Simple atrophy or marasmus in child eight months old. (St. Paul City and County Hospital.)

FIG. 68.—Same case after three months of proper feeding and care. (St. Paul City and County Hospital.)

The chronic cases are the ones which tax the ingenuity and patience of all concerned.

TREATMENT.—When the atrophy is due to the food, the offending element—whether fat, sugar or salts—must be de-

termined and eliminated. Even when these cases are placed upon a proper diet they must pass through a period of repair which may require several weeks or months before any marked improvement may be noticed. The securing of at least some breast milk is of vital importance.

The bowels require special care, as the markedly atrophic muscles have not sufficient force to produce normal evacuation.

Fig. 69.—Rectal irrigation.

Injections of half an ounce of olive oil will usually result in a good evacuation and do no harm. Occasionally irrigations with normal salt solution may be necessary to empty the colon of impacted fæces (Fig. 69). General massage is of the greatest benefit, and night and morning, for 15 minutes, olive oil or cocoanut oil should be rubbed into the skin.

Abscesses in the Skin.—Abscesses of the skin are common and should be opened at the proper time. Great judgment must

be exercised in the feeding of these cases; their tolerance is usually small at first, and if exceeded, the result is always a backward step. They should be kept in the open as much as possible and allowed all the freedom their muscles are capable of.

Prognosis.—After these cases begin to improve and the digestion becomes normal, it is marvellous how rapidly they increase in weight and strength, so that at 18 months they are sometimes almost as far advanced as the normal child at that age.

Rickets

Rickets is a disorder of nutrition, occurring usually within the first two years of life, and due to faulty diet and improper hygienic surroundings.

Etiology.—Rickets is first mentioned in the English medical literature as early as 1604, and has been generally known on the continent of Europe as the "English Sickness," although it is now quite as common on the Continent as in England. The disease has increased greatly with the introduction of artificial feeding, and particularly with the proprietary foods. It is rare to see a baby who has been fed exclusively on condensed milk or one of the desiccated malted foods, who is not suffering from rickets to some degree. The races of the extreme South and extreme North are rarely affected by the disease when they remain in their own country. When, however, Italians or negroes go North, their children usually suffer from rickets, and often in an aggravated form. A diet poor in fat seems to predispose to the disease. Experiments have shown that young lions who were weaned early and fed exclusively on raw meat developed the disease. Upon the addition of milk and cod-liver oil they were soon cured.

Symptoms.—Although the most marked changes are in the skeleton, the first symptoms are usually constitutional. The baby is fretful, sleeps badly, and when it is taken up the pillow where the head has rested is often wet with perspiration. (There is often a spot on the back of the head the size of the palm of the hand where the hair has been completely rubbed

off from rolling the head about on the pillow.) There is often a slight elevation of temperature. Tenderness of the bones is often an early symptom, and when the baby is raised in the ordinary manner, or if the legs are touched, it cries as if in pain. Not infrequently, after the baby has begun to walk it suddenly

Fig. 70.

Fig. 71.

Fig. 70.—Characteristic sitting position of a child with rickets.
Fig. 71.—Bow-legs. (Willard's Childhood Surgery.)

ceases again, and sits with legs crossed and cannot be persuaded to make the effort to stand or walk (Fig. 70).

Changes in the Bones.—Later there is marked evidence of changes in the bones. The enlargement of the epiphyses at the wrists and ankles and the rhachitic rosary (Fig. 78), the

beaded condition of the junction of the ribs and sternum, are early evidences of the changes in the bones.

Bow-legs.—Later there may be marked deformity of the long bones of the legs or arms, and of the spine. "Every case of bow-legs is the result of rickets" (Figs. 71 and 72).

The changes in the shape of the pelvis in girls may later in life result in great difficulty in the bearing of children.

Craniotabes.—The bones of the head often show marked changes. They are sometimes so soft that they can be dented like the case of a watch—a condition known as craniotabes.

Fig. 72.—Knock-knee resulting from rickets.

Open Fontanelles.—The anterior fontanelle is usually large and markedly delayed in closing.

The Teeth.—The eruption of the teeth is usually delayed, the teeth coming at irregular times. They are prone to early decay as a result of improper development of the enamel.

The head of the rhachitic child has later a peculiarly square appearance, due chiefly to a marked thickening of the frontal and parietal bones (Fig. 73).

Deformities of the chest—pigeon-breast (Fig. 74), Harrison's groove—and deformities of the spine—scoliosis, lordosis, and kyphosis (Figs. 75, 76, and 77)—are common in rickets.

Prophylaxis.—To prevent rickets, keep the baby on the breast, and if the mother has not sufficient milk, the deficiency should be made up with cow's milk.

Treatment.—When infants are suffering from rickets, early recognition and the institution of a proper diet are of vital importance.[1]

[1] A diet relatively high in fat and low in carbohydrates is indicated. Cod-liver oil and phosphorus is supposed to be a specific.

It is much easier to prevent deformities than to correct them. When deformities have already begun much may be done by proper apparatus in the hands of a skilful physician to prevent further deformity and to correct those already present.

Scurvy, Scorbutus (Barlow's Disease)

Etiology.—Scurvy is a disease of nutrition, resulting from improper food and particularly from the exclusive use of a food

Fig. 73.—Square shaped head characteristic in severe rickets.

which has been sterilized. The disease is probably the same from which sailors suffered in the days of sailing vessels, when they were forced to exist for long periods without any fresh fruit or vegetables in their diet.

Since the patent foods have come into such general use, the number of cases of scurvy in infants has markedly increased.

Scurvy in children was formerly thought to be one of the symptoms of a severe rickets. It was demonstrated by Sir Thomas Barlow in 1883 to be a separate disease. It is common,

FIG. 74.—Pigeon-breast, resulting from rickets.

however, to have both diseases occurring in the same patient at the same time (Fig. 78).

SYMPTOMS.—The disease is characterized by pain and tenderness along the shafts of the bones, due to subperiosteal hemorrhages. The child frequently screams with pain when being changed or otherwise handled. Such sensibility is always significant and should awaken the nurse's suspicion as to the pos-

sibility of scurvy. These hemorrhages sometimes later invade the tissues and may be seen as yellow areas where the tissues and skin have been stained by the blood pigment. Hemorrhages around the eyes with ecchymosis resembling "black eye," occur occasionally in these cases (Fig. 78).

Hemorrhages around the teeth are characteristic and are seen as a blue line on the margin of the gums, and it is not uncommon to see a blood-blister over the crown of a prospective tooth.

FIG. 75 FIG. 76 FIG. 77

FIG. 75.—Scoliosis resulting from rickets.
FIG. 76.—Lordosis, resulting from rickets.
FIG. 77.—Kyphosis, resulting from rickets.

There is usually marked anæmia. These cases are bad subjects for surgery, as the hemorrhage is difficult to check owing to the slowness with which the blood clots.

PREVENTION.—Babies on the breast never develop scurvy. When children are fed on any sterilized food, either cow's milk or the proprietary foods, some uncooked fruit or vegetable juice should be given daily.

Treatment.—When scurvy has already developed, orange juice is a specific. If orange juice is too laxative some other uncooked fruit juice should be given. The anæmia and associated rickets will gradually disappear under the proper food and medication.

Purpura, Melæna Neonatorum, and Hæmophilia

purpura

"Purpura is the name applied to the spontaneous extravasation of blood in and beneath the skin and mucous membranes."

Fig. 78.—A case of scurvy in a child of six months, showing the hemorrhage around the left eye. Showing also a pronounced rhachitic rosary. (Courtesy of Dr. P. H. Bennion.)

The symptoms are the chief features of the disease, the cause being frequently unknown.

A variety of forms were formerly described as: purpura simplex, purpura rheumatica, purpura hæmorrhagica, purpura toxica, etc

It is probable that the condition is practically always due to some infection, or to the effect of bacterial products.

A clear analysis of the symptoms, including a careful analysis of blood and urine, will frequently give a clue to the cause of the hemorrhages.

melæna neonatorum (the hemorrhagic disease)

These terms are meant to designate a form of bleeding which occurs spontaneously in the new-born. The bleeding most frequently occurs on the second or third day, although it may begin

a few hours after birth. The most common site of bleeding is the bowel, the blood appearing in the stool, either clotted or in liquid form, mixed with the meconium. The next most common site of the bleeding is the stomach, in which case the blood is usually vomited. Bleeding may occur from the nose or any of the mucous membranes, and I have seen in one case large amounts of blood passed in the urine. The cause of the disease is not known. The condition is serious, but not necessarily fatal. Under favorable conditions there is a mortality of probably less than 50 per cent.

Treatment.—Satisfactory results have followed the use of gelatin both by mouth and by hypodermic injection. A 5 per cent. solution of ordinary flake gelatin is made in water, or 1 ounce of gelatin in 20 ounces of water. The solution should be boiled in order to sterilize it, as anthrax bacilli have not infrequently been found in gelatin. The baby may be given a small amount every hour, 1–2 teaspoons, or ½ to 1 ounce every three or four hours, by mouth. For subcutaneous injection a 10 per cent. solution should be used, 1 to 2 drachms being injected every three or four hours, until the bleeding stops. Gelatin is now put up by manufacturing chemists in the proper amounts for hypodermic use.

In the use of so large an amount as ʒii hypodermically, great care must be taken not to produce sufficient trauma in the tissues as to result in abscess formation. After the injection the area should not be massaged to promote absorption. Gelatin is supposed to be efficacious owing to the amount of calcium it contains. Calcium may be given by mouth in the form of calcium lactate grains x to xx three times daily with the food.

Transfusion of Blood.—Transfusion of blood from the veins of another person to those of the infant has been much practised of late, and with beneficial results. The technic is difficult and requires great skill and considerable experience. A simple manner of transfusion is to withdraw blood from the vein of one person by means of a cannula and introduce it into

the vein or tissue of the infant by means of a large hypodermic syringe. Considerable difficulty is experienced in keeping the blood from clotting long enongh to be introduced. To this end, a paraffin-lined tube (Kimpton-Brown) and sterilized normal salt solution should always be at hand. The greatest care and thoroughness in the cleansing of the skin, as well as all instruments, should be exercised. Hypodermic injections of human blood serum and horse serum have been used with varying degrees of success.

HÆMOPHILIA

The disease known as hæmophilia, meaning a tendency to bleed, is, according to all authorities, rare in infancy and early childhood, if, indeed, it occurs at all. After the second or third year it is not uncommon. The disease is distinctly hereditary, being frequently traced through seven or eight generations. The males are more liable, twelve to one, to be affected than the females, although it is more liable to be transmitted through the mother, usually without herself being affected.

Whenever a history of hæmophilia is obtainable, even if it is ever so remote, no surgical procedure should be undertaken except under great compulsion. The surgeon should always be informed if there is the least suspicion of bleeding in the family.

CHAPTER XVI

JAUNDICE IN BABIES. (ICTERUS)

JAUNDICE may be roughly divided into two classes:

1. A physiological jaundice from which a large percentage of new-born infants suffer and which disappears in a week or ten days without leaving any apparent injurious effect. This condition is known as icterus neonatorum.

2. A pathological jaundice due to congenital obliteration of the bile-ducts or to some inflammatory condition.

Holt found jaundice in 33.3 per cent. of new-born infants and some authorities in a much larger percentage.

ETIOLOGY.—There have been many explanations as to the cause of icterus. The most plausible one is offered by Knapfelmacher, who holds that during the first few days, owing to the activity of the bile cells, the capillaries become blocked with tenacious bile, resulting in bile pigment being absorbed into the blood stream. The condition is not fatal and needs no treatment.

Jaundice from congenital obliteration of the bile-ducts is rare and ends fatally.

CATARRHAL JAUNDICE.—In older children, catarrhal jaundice due to an inflammation of the common bile-ducts, extending from the bowel and producing sometimes grave symptoms, is not uncommon. Catarrhal jaundice occurs not infrequently in epidemics. During the acute stage there is often marked depression of the circulation.

GALL-STONES.—Jaundice in children as a result of gall-stones is extremely rare.

DIET.—The simplest diet should be given and the bowels kept open with some simple saline, such as sodium phosphate or milk of magnesia. The patient should be kept in bed.

BILE IN THE URINE.—In all forms of jaundice the bile is eliminated in the urine, as well as in the perspiration.

CHAPTER XVII

THE URINE

"THE *kidneys* undoubtedly functionate during the last weeks of intra-uterine life, and the bladder has been found distended with urine at birth." Urine is frequently passed directly after birth, after which it may not be again voided during the next twenty-four hours, a fact which gives many nurses and mothers great, but unnecessary, concern. The first urine passed is usually pale in color and of a low specific gravity. As the baby gets more milk from the mother, the urine gradually assumes an amber color. Not infrequently there are small yellow or reddish brick-dust deposits on the diaper. They are made up of ammonium urate and uric acid and have no special significance.

QUANTITY OF URINE.—The quantity of urine secreted during the first few days, or at any time for that matter, depends largely upon the amount of fluid taken. During the first few days the amount of urine will be small unless water is given freely, as there is little secretion of milk up to this time.

In breast-fed babies the amount of urine will usually be less than in those fed on artificial food, since the quantity of liquid consumed is usually less. Infants who are allowed to go to sleep with a bottle of water will consequently secrete a large amount of urine.

The following quantities represent approximately the normal amount of urine which should be passed at different ages:

Age	Amount in ounces
1st day	½ to 2 ounces.
7th day	6 to 10 ounces.
1 month	10 to 14 ounces.
3 months	15 to 17 ounces.
6 months	17 to 20 ounces.
12 months	20 to 25 ounces.

FREQUENCY OF URINATION.—There is a marked difference in

infants as to the frequency with which they pass urine. When young infants are getting a normal amount of food they pass urine every hour or two when awake, but may retain it for three or four hours while asleep. The amount of fluid taken will usually determine the frequency under normal conditions.

Bladder Control.—Children do not usually gain control of the bladder-function before they are two and a half to three years of age, but with careful training and occasional mishaps, they may be taught control considerably earlier. (For incontinence, see page 163.)

Reaction.—The reaction of the urine in the new-born is usually distinctly acid. For the rest of life it is normally faintly acid or neutral. The specific gravity for the first day is 1010 to 1012. From that time until the child is two years old, it varies normally from 1004 to 1012, and does not reach that of the adult, 1020, until the child has reached the age of six to eight years

Clinical Examination of the Urine.—The examination of the urine in infancy and childhood is of the greatest clinical significance. In all cases of illness in infants and children the urine should be systematically examined by the physician. In order that he be able to do this, a specimen of the urine must be secured. This is not usually difficult. If the baby is watched for an hour or so, and the diaper allowed to remain off, a specimen can usually be secured if a receptacle is at hand. Placing a cold sponge over the bladder will often result in the baby voiding urine. In male infants it is a simple matter to attach a small bottle with a strip of adhesive plaster so that the baby will pass urine directly into the bottle. For female infants a rubber glove finger stretched over the neck of a bottle or test-tube and attached around the vulva by a strip of adhesive plaster will result in a specimen being secured (Figs. 79 and 80).

In securing urine from female children great care must be taken first to thoroughly cleanse the parts around the urethra, otherwise contamination from external secretions may compli-

cate the findings, particularly under the microscope. When urine cannot be examined at once it should be kept on ice, as urine which stands for a few hours in a warm room will rapidly

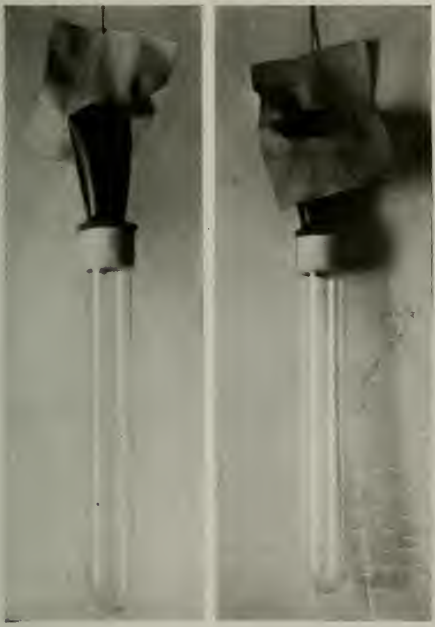

FIG. 79.—Simple device for securing a specimen of urine from female infants.

undergo decomposition and develop myriads of bacteria of various kinds.

NORMAL CONSTITUENTS OF THE URINE.—The chief normal constituents of the urine are urates, uric acid, phosphates, and chlorides, all of which vary much under normal conditions and

will depend largely upon the amount and character of the food ingested.

Eighty to 85 per cent. of the nitrogen representing the metabolism of albuminous food is excreted in the urine. There is also a considerable difference in the quantity of various salts in the urine, depending on whether a baby is breast- or bottle-fed.

Bacteria in the Urine.—Under normal conditions urine is practically sterile when passed and contains no albumin or sugar. During an infectious illness great numbers of bacteria may be passed in the urine. Certain children when in the upright position have albumin in the urine without any inflammatory condi-

Fig. 80.—Apparatus in place for securing specimen of urine.

tion of the kidneys being present. This condition is known as orthostatic albuminuria. When in the recumbent position the albumin disappears. Blood-cells are within very narrow limits also abnormal in the urine, and if found in any numbers always mean some inflammatory condition somewhere along the urinary tract.

A urine which is too concentrated as a result of excessive meat, fruit or salt in the diet, may cause inflammation and severe irritation without any infection being present.

Deposits.—Whenever the urine is abnormal in color or contains an abnormal amount of deposit of any kind, a specimen should be sent to the physician for examination, together with all the symptoms observed.

Incontinence of Urine

Incontinence of urine in older children is of common occurrence, in both boys and girls.

Many children who control their bladders perfectly during the day wet the bed at night and without knowing that anything has happened. Some children have also imperfect control during the day, and unless permitted to go often to the toilet they will usually be soiled.

In many of these cases there is simply a lack of control of the sphincter muscle. The condition is always exaggerated by nervousness and fear of punishment, while encouragement and reward may be followed by good results.

A specimen of urine should always be carefully analyzed, as some of these cases are due to a bladder infection or to urine which is too concentrated from improper diet. An excessive amount of certain fruits, such as oranges or grape-fruit, may set up a bladder irritation, causing incontinence.

When no local condition can be found to account for the incontinence, the child must be taught to control the sphincter.

The child may be required to stop and resume urination several times during the emptying of the bladder.

The amount of fluid allowed should be greatly restricted during the latter part of the afternoon, and the child taken up regularly, at the parents' bedtime, and again during the night, if necessary.

Diseases of the Genito-urinary Tract

Etiology.—Infections of the genito-urinary tract are very common in infants and young children, and particularly in females. The two most common organisms producing these infections are the colon bacillus and the gonococcus.

The character of the female genitals, the labia, the vagina, and the short urethra, the opening of which is hidden in the folds of the mucous membrane, makes girls particularly susceptible to infections, as compared with boys.

Colon Bacillus.—Infections involving the bladder, and not infrequently the pelvis of the kidney, or even the kidney itself, are frequently produced by the colon bacillus. The fact that such a large percentage of these cases occur in girls suggests soiling from the stools as the probable source of infection in most cases.

The greatest care should, therefore, be exercised in cleansing infants when they are soiled with the stool, so that none of the fecal matter comes in contact with the urethra. (See care of the genitals.)

Symptoms.—Babies suffering from an acute pyelocystitis due to the colon bacillus have a high fever, frequently as high as 105°, which may persist for days or may subside in a few hours, and then suddenly recur. The condition sometimes assumes somewhat the character of typhoid; a blood and urine examination, however, would usually differentiate the two. Where there is an involvement of the bladder there is great restlessness and frequent micturition, with straining, sometimes only a few drops being passed at one time. The mucous membrane around the urethra is usually inflamed. The urine is usually turbid when passed, and after standing for a few minutes if it contains pus there will be a deposit. In many cases the turbid character is due to myriads of colon bacilli. The urine is usually acid in reaction.

Microscopic Examination.—When such an infection is suspected a specimen should be obtained, at any cost of time or trouble, and examined microscopically. The diet should be of the simplest character, milk and cereals chiefly, with large amounts of water. Sugar and salt should be largely eliminated from the diet. In certain cases a catheterized specimen of urine must be obtained, to determine the bacterial count.

When the temperature is high and there is great restlessness, a cool sponge or pack is indicated. When there is excessive irritation of the bladder hot fomentations placed over the bladder and between the thighs will sometimes give marked relief. The character of the medication will depend upon the examination

of the urine. Rest in bed with large quantities of water by mouth are of great importance in the treatment.

Gonorrhœa.—Gonorrhœal infection of the genital or urinary tract is a serious condition and demands the most careful and intelligent care.

Every discharge from the urethra or vagina in a child should be examined microscopically. A smear should be made on a glass slide and submitted to the physician for examination.

In hospitals, where several children occupy a ward, all new cases should be first isolated until smears are made and examined. The disease has a remarkable tendency to spread, and too great care cannot be taken to prevent the introduction of a case into the wards.

Isolation.—A nurse who has charge of a gonorrhœa case should not take care of other children. Her hands should be thoroughly washed after each dressing. The child should be isolated and all diapers and clothing washed and boiled. The nurse should realize the danger of infection to herself and should be especially careful not to infect her own eyes. Whenever irrigations are given she should wear large glasses or goggles to prevent water from splashing into her eyes.

The hands of the baby should not be allowed to come in contact with the genitals, as an infection of the eyes may follow. Diapers of cheese-cloth which can be burned are more practical than those which have to be washed.

Rest in Bed.—A child suffering from a gonorrhœal vaginitis or urethritis should be kept in bed during the acute stage and the medicine instilled into the vagina frequently with a medicine dropper with a blunt point. To do this most successfully, the child should be placed on the back and the knees drawn well up over the abdomen. Plenty of water by mouth, with fairly large doses of some urinary antiseptic, such as hexamethylenamine (urotropin), may do something to prevent the infection from ascending further in the urinary tract. Under certain conditions irrigations of the urethra and bladder may be necessary.

CHAPTER XVIII

OPHTHALMIA NEONATORUM (GONORRHŒAL OPHTHALMIA)

Ophthalmia neonatorum is usually due to the gonococcus, although it may occasionally result from the pneumococcus or one of the other forms of pus cocci. The infection is usually acquired from the vaginal discharges of the mother at the time of birth.

Blindness.—Gonorrhœal ophthalmia is responsible for a large percentage of blindness. According to Cohn, 31 per cent. of the inmates in the asylums for the blind in Germany are a result of this disease, and in this country, according to Lux, the percentage is about the same.

Means of Infection.—The disease may also be acquired from infected dressings, or utensils, or from the hands of the physician or nurse. The disease usually manifests itself on the second or third day after birth. In the great majority of the cases both eyes are affected from the first, or soon become infected. The eyelids become more and more œdematous, so that after a day or so it is impossible for the infant to open them. The discharge, which at first is somewhat serous and flocculent, soon becomes creamy and more profuse, so that the conjunctiva is constantly bathed in pus.

Duration.—Under favorable conditions the disease lasts from two to six weeks.

Prevention.—As a matter of prevention, whenever there is the least suspicion of a gonorrhœal infection, the eyes should be bathed with sterile water directly after birth and one drop of a 2 per cent. solution of silver nitrate dropped into each eye. If only one eye is affected, the other should be sealed up with gutta-percha tissue, or covered with oiled silk. It should be

watched frequently, and in case of possible infection heroic measures should be taken at once.

Treatment.—The conjunctiva should be kept as free from secretion as possible by douching every half-hour, or every hour, with some mild antiseptic solution. Some device, such as an inverted ear speculum, for getting the solution between the lids must be used. The eyelids must be separated in order to get medication within them and to wash out the secretions (Fig. 81).

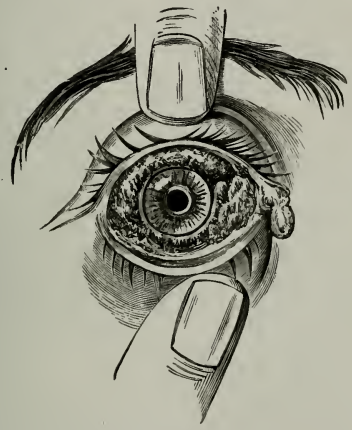

Fig. 81.—Method of separating the eyelids. (Wick's Disease of the Eye, Lea & Febiger.)

In order to do this a small piece of sterile gauze must be used under the fingers in order to make traction and an assistant will usually be necessary, if effective work is to be done. Compresses wrung out of iced water should be laid upon the eyes and changed every few minutes if the discharge is profuse (Fig. 82).

Once or twice daily the conjunctiva should be painted over by the physician with a 2 per cent. solution of silver nitrate.

FIG. 82.—Technic of applying ice compresses to the eye of an infant with ophthalmia neonatorum. Observe that the child is not placed in the lap of the nurse.

The great danger in these cases is from ulcer of the cornea, which frequently perforates, destroying the eye, or from the formation of opacities from the scar, which result in blindness.

Microscopic Examination of the Discharge.—In every case when there is any discharge from the eyes a smear should be taken and a microscopic examination made to determine its exact character, as any discharge from a baby's eye should be regarded as gonorrhœal until proved not to be. In no case should the social standing of the family preclude this precaution being taken, when a discharge appears in the eyes of the newborn infant.

CHAPTER XIX

DEFECTIVE VISION, ITS CAUSES AND SIGNIFICANCE

Defects of vision are common in children of all ages.

These defects may be congenital or acquired. Congenital defects may be due to degenerative changes in the structure of the eye, cornea, lens, retina, or optic nerve, or to simple malformations in the shape of the eye, by which the light is not properly focused on the retina. Such children are near-sighted (myopic), far-sighted (hyperopic), or astigmatic.

Children also suffer from defective muscle control of one or both eyes, in which case the eyes do not properly coördinate. When the incoördination is of such a degree that the axes of the eyes are distinctly out of line, the condition is known as strabismus, cross-eyes, or squint. Many of the muscle defects result from the acute infectious diseases, particularly infantile paralysis and diphtheria.

Defects of vision are frequently due to opacities of the cornea, resulting from gonorrhœal ulcers, interstitial keratitis due to syphilis, inherited or acquired, and, among certain immigrants, to a contagious disease known as trachoma (granular lids), which produces serious opacities of the cornea, and even blindness.

Headache.—Many of the errors of refraction go unrecognized until children reach the school age, and many times only then after severe symptoms, such as headache or other nervous symptoms, have appeared. The margins of the lids are liable to be inflamed and in the morning there is often considerable secretion.

School Children With Refractive Errors.—"The number of short-sighted pupils increases from the lowest to the highest schools, and the increase is in direct proportion to the

time devoted to the strain of school life. Forty-seven per cent. of college graduates are myopic. Far-sightedness passes into near-sightedness through astigmatism as a result of the effort made to properly focus the eyes."

Necessity for Systematic Examination of the Eyes.—Every child before entering school should, therefore, have a systematic examination made, by an oculist, as to the state of its vision, and if found sufficiently defective, proper glasses should be adjusted. Many of the muscular defects may be corrected by exercises or by proper surgical measures.

Eye-strain.—Eye-strain often results from improper lighting. The light may be insufficient or improperly directed. Bright lights which shine directly into the eyes should never be permitted. The light should always come from behind and over the left shoulder.

Reading at Improper Angles.—The angle at which the book is held in relation to the eyes is of the greatest importance. Children should never be allowed to read while lying down, as eye-strain is a sure result. Heavy books, if held, are almost certain to be read at an improper angle and at an improper distance.

CHAPTER XX

TETANUS

Tetanus Bacillus.—Tetanus in new-born infants (tetanus neonatorum) is usually due to an infection through the umbilicus. The disease is due to the tetanus bacillus. This organism is a constant inhabitant of garden earth and horse manure. Among the poor, and especially where there are few precautions taken regarding cleanliness, tetanus in new-born babies is not uncommon. Osler reports that in some of the West Indian islands more than half of the mortality among the native children was due to tetanus.

Symptoms.—The disease is characterized by tonic contractions of the muscles. One of the early symptoms is the difficulty in nursing, because of the child's inability to relax the muscles of the jaws and face. The muscular contractions become more marked and more general, so that there may be marked retraction of the head, and even opisthotonos (Fig. 109). The muscles frequently become fixed in extreme flexion. The child often dies from fixation of the muscles of respiration.

Punctured and Lacerated Wounds.—Tetanus in older children usually results from some punctured or lacerated wound, such as that produced by stepping on a nail or from the explosion of a toy pistol or fire-cracker.

All such wounds should be thoroughly cleansed at once, the child should be taken to a physician, and if the wound is such that it is impossible to thoroughly irrigate it an opening sufficiently large to insure proper drainage may be necessary. Deep punctured wounds may have to be curetted and cauterized.

Treatment.—When a wound cannot be thoroughly cleansed, or when some time has elapsed before it has been cleaned, a dose of anti-tetanic serum should be given. The treatment of

well-developed cases calls for large doses of serum, both subcutaneously and intraspinously. An absolutely quiet room and as little handling as possible are essentials in the treatment of these cases, as the slightest external stimulus is often sufficient to produce violent tonic convulsions.

To control the convulsions it may be necessary to give strong sedatives hypodermically, such as chloral or morphine, or its derivatives, and inhalations of chloroform may be a temporary measure.

CHAPTER XXI

CRETINISM AND MYXŒDEMA IN CHILDREN

Etiology.—Cretinism is a term applied to infants and children who from a very early age have shown signs of insufficient thyroid secretion. The conditions may be due to a congenital absence of the thyroid gland, or to an early degeneration of the gland structure, resulting in insufficient secretion.

There are various degrees of cretinism, varying from slight insufficiency with its corresponding symptoms, to complete absence of the gland.

Symptoms.—The symptoms of the well-developed cretin are quite characteristic (Figs. 83, 84 and 85). During the first few months there may be little to suggest the cretin, although the infant usually does not grow normally and is not responsive. This has been explained by the probability that through the mother's milk the infant may derive a certain amount of thyroid secretion.

The following is a clinical picture of the condition, by A. E. Garrod:

"In build, the child is stumpy and thick-set, and the limbs are short in comparison to the trunk. The skin is harsh and dry and has a yellowish, sallow tint, whereas the extremities are cold, as a rule, and exhibit a distinct cyanosis.

"The hair of the head is coarse, brittle and scanty, and usually reddish-brown in color. The individual hairs seem to be set too widely apart, but the body may be covered in parts, as also may be the forehead, with a coarse *down*. The fontanelle remains open long after the period at which it closes in the normal child. The eruption of the milk teeth is usually, although not always, delayed and these teeth persist much longer than is normal and permanent teeth are correspondingly delayed."

The facial expression is characteristic. The eyes are narrow and set far apart. The nose is broad and flat. The lips

are thick and the tongue usually protruding between the lips, as if too large for the mouth.

The abdomen is usually large and the umbilicus protruding,

Fig. 83.

Fig. 84.

Fig. 83.—Typical cretin, two and one-half years old. (Holt, "Diseases of Infancy and Childhood," Appleton.)

Fig. 84.—Typical cretin. (Holt, "Diseases of Infancy and Childhood," Appleton.)

from the presence of umbilical hernia. The fingers are short and stumpy.

The mental development is as backward as the physical, and when six or eight years old the mentality is often that of a child of one year or less.

"The disposition is usually placid and apathetic." There are lacking the spasmodic fits of anger so common in the other forms of the mentally defective.

Treatment.—The treatment consists in supplying the proper amount of thyroid secretion. This is usually derived from the thyroid gland of the sheep and given in tablet form. An excessive amount may produce symptoms of hyperthyroidism which

Fig. 85.—After six months' treatment with thyroid extract. (Holt, "Diseases of Infancy and Childhood," Appleton.)

are not unlike those of exophthalmic goitre,[1] *i.e.*, rapid and irregular heart and muscular tremor.

If a diagnosis is made sufficiently early and treatment begun and persisted in, these cases may develop almost normally. In case of long standing, the results of treatment will be correspondingly unsatisfactory.

[1] For hyperthyroidism and exophthalmic goitre, see a treatise on general medicine.

CHAPTER XXII

CONGENITAL DEFORMITIES: CLUB-FOOT—CONGENITAL DISLOCATION OF THE HIP—MALFORMATIONS OF THE LIPS, TONGUE, AND PALATE

Club-foot

There are four simple forms of club-foot or talipes described, namely:

1. Talipes equinus, a condition in which the foot is extended, the heel being drawn up. In this position the patient walks upon the ends of the heads of the metatarsal bones, an attitude that suggested the name equinus (horse-like).

2. Talipes calcaneus, the dorsi-flexed foot, in which the patient walks on the heel.

3. Talipes varus, a condition in which the foot is inverted.

4. Talipes valgus, a condition in which the foot is everted.

The most common form is a combination of two of these forms known as talipes equinovarus, in which the foot is extended and at the same time turned in. The talipes equinovarus forms 77.4 per cent. of the total number of club-foot occurring in infants. This form is illustrated by the accompanying plates (Figs. 86 and 87).

The disease may be congenital or acquired. Many of the acquired cases result from contractions of the muscles due to infantile paralysis (anterior poliomyelitis).

It is apparent that the longer the bones remain in incorrect relative positions to each other, the more exaggerated will the deformities become and the less chance there will be of securing proper correction. To this end infants with club-foot should be taken at once to an orthopedic surgeon where proper treatment in the way of reduction and the application of plaster casts may be begun.

FIG. 86.

FIG. 87.

FIG. 86.—Club-foot in boy of seven years.
FIG. 87.—Same case after one year's treatment. (Minnesota State Hospital for Crippled and Deformed Children.)

When treatment in these cases is begun early and properly persisted in, many of them develop almost normally, so that after a few years practically no deformity is apparent.

Congenital Dislocation of the Hip

The dislocation may be single or double.

After the child begins to walk, there should be no special difficulty in recognizing that there is something wrong. The child should be taken to a physician for examination.

By proper manipulation by a skilled orthopedist, these dislocations may frequently be reduced and held in place, until nature develops a joint.

The accompanying illustration (Fig. 88) shows the degree of deformity which may result in allowing these cases to go untreated.

Fig. 88.—Congenital dislocation of the hip (untreated). (Minnesota Hospital for Crippled and Deformed Children.)

Malformations of the Lips, Tongue, and Palate

Hare-lip and Cleft Palate

These are among the most frequent congenital deformities. Hare-lip may be either single or double. The fissure may vary from a slight notch in the lip to a complete division, extending on one or both sides to and including the floor of the nose (Fig. 89). Frequently accompanying a hare-lip there is a wide gap in the roof of the mouth.

Surgical Treatment. — The treatment of these cases is surgical, the time for operation being usually postponed until the infant is at least several months old. Not infrequently the operation for closure of the lip and palate may require more than one operation. Inability to nurse may force the surgeon to operate early.

Feeding.—The feeding is often a difficult problem. If there is any considerable separation of the lip or palate, the baby will be unable to nurse or take milk from a nipple. It will usually

Fig. 89.

Fig. 90.

Fig. 89.—Double hare-lip and cleft palate. (Courtesy of Dr. W. A. Dennis.)
Fig. 90.—Same case one year after operation.

be necessary to feed it with a spoon or dropper. A modified Breck feeder (see Fig. 47), made larger than for premature infants, can be used to great advantage.

Many of these cases die of starvation because they get insufficient food.

Breast Milk.—The breast milk should be maintained by pumping or by expression and given the baby as described above, or where the mother has insufficient milk, breast milk may frequently be secured from other sources. A thin plate of rubber may sometimes be successfully used during nursing, to close the cleft, when it is not too wide.

Although some of the cases present a hideous appearance, the modern plastic surgeon can usually transform them into normal looking individuals (Fig. 90).

TONGUE-TIE

This deformity is not nearly so frequent as most people suppose. If the tongue can be protruded beyond the lips, it is not of sufficient gravity to warrant an operation. If, however, the *frænum* is so short as to interfere with the baby's nursing, or later with its articulation, it should be cut with a dull scissors and by blunt dissection. Whenever there is any possible history of bleeding in the family the operation should never be done under any circumstances.

CHAPTER XXIII

ENLARGEMENT OF THE BREASTS IN INFANTS

Enlargement of the breasts in young infants is of rather common occurrence. Combined with this enlargement is a secretion of fluid which closely resembles colostrum or milk. The amount of this fluid which can be expressed is from a few drops to one-half teaspoonful. This milk, which was supposed in olden times to have some supernatural origin, was called "witch's milk."

The condition has no particular significance, and if let alone it will usually disappear in a couple of weeks. If, however, the breasts are rubbed and squeezed, serious trauma may result, producing considerable swelling, and even abscess formation, the infectious organisms entering probably by way of the ducts.

Treatment.—When enlargement of the breasts occurs, even when there is a secretion of milk from the ducts, nothing more than simple cleanliness is necessary. If there is evidence of inflammation and abscess formation, the physician should be notified, as it may be necessary to evacuate the pus.

CHAPTER XXIV

AFFECTIONS OF THE DIGESTIVE TRACT

Inflammation of the Mucous Membrane of the Mouth (Stomatitis)

There are several forms of stomatitis common to infants. These are: catarrhal stomatitis; herpetic, or aphthous stomatitis; thrush; sprue; soor; ulcerative stomatitis and gangrenous stomatitis.

Catarrhal Stomatitis.—This condition is common in infants, particularly in those artificially fed. It may occur from hard or rough nipples, comforts, from swabbing the mouth, and during many of the infectious diseases, such as typhoid fever and scarlet fever.

The condition is characterized by redness and swelling of the mucous membrane. There is undoubtedly marked tenderness to pressure, and as a result the baby is fretful, drools a great deal, and shows a marked disinclination to take food. There may be slight fever.

Treatment.—All irritation should be removed; the food should be given for a few days by means of a spoon, or modified Breck feeder. The mouth may be washed or swabbed after each feeding with some mild alkaline and antiseptic solution, such as Seiler's solution.

Aphthous of follicular stomatitis is characterized by the appearance of small blisters scattered over the tongue and cheeks. In the latter form the superficial ulcers are very painful. The same treatment as for the catarrhal form may be used, except that the small ulcers may have to be touched with silver nitrate.

Thrush or sprue is a common affection in nursing babies. It appears as white flakes which resemble small milk curds, scattered over the mucous membrane of the mouth. It is made

up chiefly of an exudate of fibrin. If these spots are wiped off, bleeding points are left, showing that there has been some superficial destruction of the mucous membrane. The condition is due to the growth in the mouth of a fungus called saccharomyces albicans.

All irritation should be removed and the mouth washed—not swabbed—after each nursing with a mild antiseptic. Thrush grows more rapidly on an acid medium; therefore, in the treatment an alkaline solution should always be used. The condition disappears more quickly in artificially-fed infants if the sugar is omitted for a time.

Ulcerative stomatitis usually occurs in older children, beginning around the margins of the gums and producing more or less destruction of the mucous membrane. There may be marked involvement of the adjacent glands as a result of absorption of the infection by the lymphatics.

The condition occurs usually in children with bad teeth, or in those with lowered vitality. Severe ulceration of the mucous membrane may follow or complicate the infectious diseases. Ulcerative stomatitis due to syphilis is, of course, common.

Gangrenous stomatitis or noma—an extreme condition, in which a large portion of the cheek may be eaten away—may sometimes follow the infectious diseases, particularly measles or scarlet fever. The disease is very fatal, at least two-thirds of the cases succumbing. The treatment is largely surgical and consists of curettage and cauterization of the tissues beyond the gangrenous area.

The maintenance of the vitality by proper food in these cases is of the greatest importance, as the chance of recovery depends upon the strength of the tissues to resist further invasion.

Tonsillitis and Pharyngitis

The tonsils are masses of lymphoid tissue situated between the pillars of the fauces, and when normal in size they do not project beyond the margins of the pillars. There is, however,

a great difference in the size of the tonsils in otherwise healthy individuals, so that within certain limits the size in itself is not a safe index as to their pathology. Many children have large tonsils from birth but without any symptoms. The exact function of the tonsils is yet undecided. It is possible, however, that they are really lymph-glands and serve normally to arrest infection arising in the mucous membrane of the mouth. There is little doubt that infections about the teeth have much to do in producing enlargement and even abscess of the tonsils.

Varieties.—There are various forms of tonsillitis, the most common of which is the *simple catarrhal* form in which the tonsils are somewhat swollen and reddened. There may be slight fever and pain upon swallowing.

The next most common form is what is generally called *follicular tonsillitis*. The tonsils are swollen and inflamed, and each crypt in the surface of the tonsil is filled with a plug of whitish exudate.

There is usually marked systemic disturbance, beginning with a chill, high temperature, and a feeling of general malaise. There is usually considerable pain on swallowing, and the cervical glands at the angle of the jaw are usually enlarged and tender to pressure.

Membranous Tonsillitis (*Pseudodiphtheria*).—This form of tonsillitis is characterized by a more or less diffuse membrane which covers the tonsils, and many times the pillars of the fauces and the uvula as well. The inflammation is usually due either to the streptococcus or to the bacillus of Vincent, discovered by him in 1896. The disease is differentiated from diphtheria by a microscopic examination.

Symptoms.—There is usually a marked systemic poisoning from tonsillitis, with a tendency to involvement of the heart and joints. All cases of tonsillitis where there is membrane should have smears or cultures made, as there are many cases which cannot be otherwise differentiated from diphtheria. Abscess of the tonsil (quinsy) frequently follows an acute attack

of one of the foregoing forms and requires surgical interference if it does not open itself within a reasonable time.

Rest in bed should be insisted upon for several days on account of possible involvement of the heart. Local application of tincture of iodine, 2 to 5 per cent., of nitrate of silver, 2 to 5 per cent., as well as gargling with some antiseptic solution, such as Seiler's, may be of benefit.

Removal of the Tonsils.—The question of removal of the tonsils is one which is now receiving much consideration and discussion by the medical profession. That there are many tonsils which should be removed there is not the least doubt. On the other hand, simply because tonsils are larger than normal is not sufficient ground for their removal.

If a child has repeated attacks of tonsillitis, or if after one attack the tonsils are evidently the seat of pus pockets, the tonsils should be removed.

Prevention.—If the teeth are kept healthy and clean by a thorough brushing at least once daily, and the mouth and throat cleansed of particles of food by gargling with some simple alkaline solution, such as Seiler's, infections of the tonsils would be much less frequent than they are now, and the removal of tonsils would be less often necessary. Pharyngitis usually accompanies tonsillitis, although a pharyngitis may be present without any special involvement of the tonsils.

Retropharyngeal abscess is not unknown in infants and is a dangerous condition. It may occur independently of a tonsillitis and is usually attended by difficulty in swallowing and later in breathing. Such an accumulation of pus should be evacuated at once, as it may otherwise be followed by serious if not fatal results.

Affections of the Œsophagus

Congenital malformations of the œsophagus occasionally occur. The most common forms are those in which the upper half of the tube ends in a cul de sac and the lower half opens into the trachea.

In some cases there is a membrane in the form of a diaphragm, which stretches across the lumen of the tube. These conditions are incompatible with life and the infants soon die of starvation, the position of the obstruction usually making surgical interference impossible.

In diphtheria, an extension of this membrane into the œsophagus may occur.

Strictures.—Strictures of the œsophagus, due to the swallowing of corrosive substances, such as lye, are not very uncommon in children. Strictures due to syphilitic ulcers may also occur.

Impaction of foreign bodies in the œsophagus not infrequently occurs in infants and children, producing complete or partial obstruction.

The regurgitation of food almost immediately after it has been taken, the food showing no evidence of gastric secretion, is always suggestive of œsophageal obstruction.[1] The passing of a tube will usually determine whether an obstruction is present, and its location. The location of a foreign body, such as a coin or button, may usually be determined by an X-ray examination. When such obstruction is suspected the child should be taken at once to a physician.

Malformations of the Intestine

The most common malformation is an atresia of the rectum or anus. Where the obstruction consists only of a septum at or near the anus, the condition may frequently be relieved by surgical means. If, however, the obstruction is higher up and there is a considerable length in which the tube is lacking, there is little to be done and the infant rapidly succumbs.

There is another malformation of the large bowel which is rather rare and which is not entirely incompatible with life. It is known as Hirschsprung's disease, and consists of a congenital dilation of the colon. The natural muscular power of

[1] When free hydrochloric acid is present Congo paper is turned blue.

the colon is lacking and masses of fecal matter collect in the dilated portion and have to be removed regularly by irrigation.

Diarrhœa and Intoxication

The term diarrhœa is used to cover all conditions in which there are frequent, loose movements of the bowels.

Diarrhœa may result from a great variety of causes, but if persistent it must always be considered as a serious condition in infants.

Mortality from Diarrhœal Affections.—The mortality in children of all ages from the various contagious diseases in New York City during the years 1900 to 1904 was 23,330. During the same time the mortality in infants under two years of age, due to diarrhœal affections, was 26,563 (Holt).

Owing to the lack of resistance of young infants and the delicate character of the intestinal mucous membrane, they are particularly susceptible to over-feeding, irritating substances in the food, and to infections.

Artificially-fed children are particularly liable to diarrhœa, and especially during the hot weather or during sudden and extreme changes in the weather.

Over-feeding.—The effects of over-feeding with cow's milk, or the patent foods, frequently result during the hot weather in a condition of *intoxication*, which is usually accompanied by fever, frequent watery stools, and great prostration.

Some of these cases of severe diarrhœa are undoubtedly due primarily to infected milk, but many of them are due to over-feeding with secondary putrefactive changes due to various organisms.

Diarrhœa in breast-fed infants is almost always due to over-feeding, or to purgatives which the mother is taking, being eliminated in the milk.

Diarrhœa in bottle-fed babies is frequently due to a milk too rich in cream, the stools being usually curdy and green in character.

An excessive amount of sugar or starch in the food will

also produce diarrhœa, the stools being greenish and acid in character. Such discharges usually result in marked irritation of the skin about the rectum.

Intoxication.—In cases of acute intoxication, where the movements are very frequent, the sudden loss in tissue fluids rapidly reduces the vitality. The heart is rapid and weak and the respirations slow and irregular. The tissues are shrunken, the skin dry and parchment-like, the eyes hollow and expressionless, and the child may be in a condition of collapse.

Under all conditions, whenever a diarrhœa begins, all food should be stopped at once, and only water given for a few feedings. The giving of daily doses of castor oil, or other purgatives, in diarrhœa should be prohibited. One initial dose may be given, but after that its use does real harm. In cases where there is great loss of tissue fluids, hypodermoclysis of normal salt solution may be necessary. Colon flushings should be used only under a physician's directions, as they frequently do more harm than good.

The greatest care should be exercised in getting pure milk, and all milk should be boiled or properly pasteurized.

During hot weather even in health it is always well to cut down the daily quantity of milk, and particularly the cream.

After a child has had diarrhœa it is often necessary to give a fat-free diet for a time. Buttermilk, albumin milk, or malt soup are here indicated. These, for a time, may have to be given much diluted with water.

Never encourage parents to consider the teeth as a cause of diarrhœa. If the cutting of teeth produced diarrhœa, a child would have diarrhœa constantly during the first two and one-half years of its life, since the baby is constantly in the process of getting teeth during that entire time.

Appendicitis

Appendicitis in young infants is undoubtedly rare. In children after the second or third year, it is rather common. The condition is often not recognized until after the attack is over,

when a tumor may often be felt in the region of the cæcum. I have seen it frequently happen in public clinics that a child would be brought it, with a history of having been ill a week or two previously, with fever, vomiting, and colic, and upon examination a mass of variable size would be found in the region of the appendix.

After the diagnosis has been well established it is well to have the appendix removed during the period between the attacks.

During an attack of appendicitis, or where there is any probability of the attack being appendicitis, the child should be kept in bed and all food withheld for 24 or 36 hours, with the exception of teaspoonful doses of water or broth. No cathartic should be given. The lower bowel may be emptied by a simple enema. A physician should always be sent for and the symptoms carefully watched, as surgical intervention may be necessary at any time.

Intussusception

An invagination, or telescoping, of one portion of the intestine into another is called intussusception. It may occur in any portion of the intestines, but is most common in the region of the cæcum and along the colon.

The greatest number of cases occur in infants between the fourth and twelfth month.

The condition is almost always fatal if not promptly recognized and subjected to proper surgical treatment.

The first symptoms are pain and vomiting. The pain is of a colicky intermittent character. The vomitus is first the contents of the stomach and later bile and mucus. There are usually one or two fairly normal stools, after which they consist largely of blood-stained mucus, or often of bright red blood. Frequently there is a mass which can be felt in the region of the cæcum. Whenever such symptoms present themselves, a surgeon should be summoned at once, or, better, the child should be taken to a hospital and arrangements made for immediate operation, if the surgeon decides the condition to be intussus-

ception. After the operation these cases can usually begin to have some food after a brief period, diluted breast milk being the food par excellence.

Prolapse of the Rectum

Prolapse of the rectum occurs usually in children after the second year and particularly in those where the strength of the levator ani muscles has been greatly reduced. Such conditions as simple atrophy, marasmus, predispose to the condition.

During the straining which is necessary to move the bowels the mucous membrane protrudes a variable distance. In the mild cases there is simply a fold of mucous membrane surrounding the anus, while in the more severe cases the whole thickness of the bowel is prolapsed, or there may be a certain amount of invagination. The mucous membrane is of a deep purplish color and bleeds easily (Fig. 91).

Should these children suffer from any inflammatory condition of the colon which results in frequent bowel movements, attended by straining, the prolapse will naturally be much exaggerated.

Treatment.—After each prolapse the bowel should be carefully replaced by gentle traction or pressure. The use of olive oil or vaseline will assist materially in replacing the prolapsed folds of the mucous membrane. In extreme cases it may be necessary to use iced applications, at the same time placing the child on the face with the head lowered and the pelvis high. The round end of a sofa will serve this purpose well. After the tumor is reduced it should not be permitted to protrude again if it is possible to prevent it.

The lower bowel should be emptied once daily, preferably at night, by means of a simple enema of normal salt solution. It should be introduced slowly and retained for 15 or 20 minutes. Too much fluid should not be given, or it will be rejected at once. Half a pint will usually be sufficient. The child should be put in the recumbent position during the enema and the bowels should be allowed to move in that position, but without

straining. The buttocks may be pressed together to prevent the bowel from coming down. If the child is allowed to sit on the chamber, so that it can bring its muscles to bear, it will almost surely force the mucous membrane out. When there is present a colitis and much straining, suppositories of some opiate

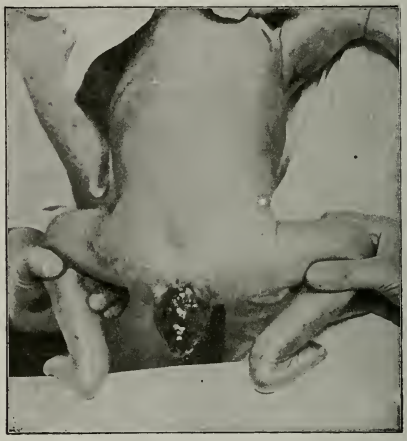

Fig. 91.—Prolapse of rectum.

may be necessary. A strip of surgeon's plaster holding the buttocks together will sometimes be useful.

The tendency to prolapse becomes less marked as the general health of the individual improves, and finally disappears. In rare cases surgical intervention may be necessary.

Intestinal Parasites

In children intestinal worms are much less common than is generally supposed. In certain parts of Europe where meat is eaten frequently uncooked, intestinal parasites are much more common. The prevalent idea among the laity that a child has worms because it picks its nose, grinds its teeth, or is restless in its sleep, is entirely erroneous. Children do pick

their noses and grind their teeth when they have worms, but they also do the same thing with many other affections, and especially when they are suffering from indigestion. A positive diagnosis of worms should be established, therefore, before any medication is given for their eradication. There is no doubt that many children are seriously poisoned by worm remedies, when usually there are no worms present.

Microscopic Examination of Stools.—Intestinal worms, if present, are always passed from time to time in the stools, where they may be recovered, or, if worms are suspected and have not been seen, a microscopic examination of the stool will reveal the presence of the eggs.

The three common varieties of intestinal worms which are found in children in this country are: (1) Tapeworm (*Tænia saginata*—beef tapeworm; *Tænia solium*—pork tapeworm); (2) *Ascaris lumbricoides*—round worms; (3) *Oxyuris vermicularis*—pin-worm, thread-worm.

TAPEWORM

The beef tapeworm is the most frequent form found in children in this country. It gains access to the intestinal tract by the eating of raw or partially cooked beef which contains the larvæ. The larvæ develop into mature worms in the intestines in about three months. From time to time the mature segments are cast off and appear in the stools (Fig. 92). The worm is from ten to twenty feet in length. The mature segments are from one-half to three-quarters of an inch long, and about half that wide.

Pork tapeworm is a rare form in this country. It comes from eating raw pork containing the larvæ. It is from five to ten feet long and the mature segments are not so long, being almost square. There is a difference in the character of the head in the two forms. The former variety is provided with no hooklets, but has four suckers, the latter having both hooklets and suckers. "The head is about the size of a mustard seed and is pigmented."

Symptoms.—There frequently are few, if any, symptoms present. The child may be anæmic and otherwise badly nourished, but, on the other hand, may be in excellent health.

The diagnosis is made by finding segments of the tapeworm in the stools. The segments should always be isolated by teasing them out in water, and then carefully examining them.

Prophylaxis consists in cooking meat sufficiently well to destroy the larvæ.

Treatment.—This consists in giving certain drugs with the idea of expelling the worm, including the head; otherwise the worm will grow again. The most popular drug is the oleoresin of the male fern. The medicine should be preceded by several hours of fasting, and the bowels should be thoroughly moved by means of a saline laxative. One-half hour following the last dose of medicine, a half ounce of castor oil should be given and all the stool saved and the fragments of the worm teased out in water in order to find the head. If the head is found it is known that the "cure" is successful, but if not found it is always doubtful.

ROUND WORM

The round worm (Fig. 93) is rarely found in infancy, but it is rather common in children after the third year. It varies in length, averaging about six inches, the female being somewhat longer than the male. It is cylindrical in shape, tapering at both ends, and is of a pinkish grey color. The eggs are extremely numerous, being numbered by millions, and are about 1/400 of an inch in diameter.

Number of Worms.—The number of worms which may be present in one individual may vary from two or three to several hundreds. A coil of worms may be so large as to produce intestinal obstruction. The manner in which the round worm gains entrance to the digestive tract has been a subject of much study. It is probable that the eggs are taken in with the food, particularly in uncooked vegetables and salads. It is found that the eggs hatch in warm, moist, garden earth so that no intermediate host is necessary.

Round worms may migrate from the small intestine into the stomach, the bile-ducts, the pancreas, and they have been found in the Eustachian tube and middle ear.

Symptoms.—There may be all sorts of symptoms produced by the presence of worms. They are so indefinite, however, that little reliance can be placed upon the symptoms alone in

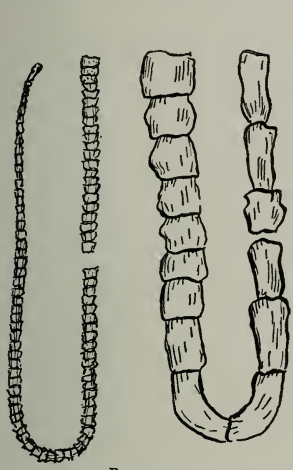

Fig. 92.

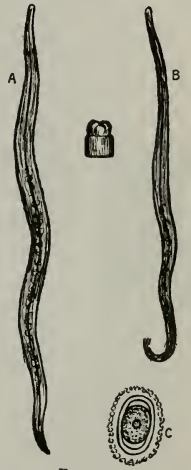

Fig. 93.

Fig. 92.—Tapeworm, showing head and segment.
Fig. 93.—Round worm; *A*, female; *B*, male; *c*, egg.

making a diagnosis. The important thing is to find the worms in the stool. After a brisk cathartic, if worms are present some of them are almost sure to come away and may be found in the stools. Where the worms are not found in the stools the eggs surely will be and may be recognized under the microscope.

Treatment.—The one drug which is relied upon for the removal of this form of worm is santonin. It should not be given except when prescribed by a physician.

PIN-WORM—THREAD-WORM

This form of parasite (Fig. 94) is quite common in children after they begin to eat a mixed diet. They resemble pieces of white thread and vary from one-third to half an inch in length. They infest the lower portion of the colon chiefly, and are often found in great numbers mixed with the stools. The eggs are passed in great numbers and are found in the folds of mucous membrane about the anus and on the skin, if the child is not kept scrupulously clean. Children may thus, if allowed to scratch themselves about the anus, infect themselves over and over again.

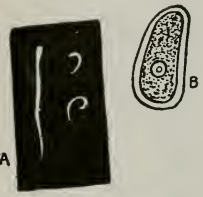

FIG. 94.—Pin- or thread-worm. *B*, eggs.

TREATMENT.—When the worms infest only the lower portion of the rectum they are usually gotten rid of without much difficulty, if the children can be kept from reinfecting themselves. If the worms infest the upper portions of the colon they may resist treatment for weeks or months.

After each stool the skin around the anus should be thoroughly washed with soap and water and a diaper or closed pajamas worn to prevent scratching.

Every night for a week a simple injection of normal salt solution to clear the bowel should be given at bed-time, after which half to one pint of quassia infusion should be allowed to run in slowly, the pelvis being raised slightly so that it will reach high in the colon. This should be retained for fifteen or twenty minutes. After the first week the injection may be given every second night for another week, and then every third night for still another. The stools should be watched subsequently for a long time to determine if there has been any return of the condition.

The idea that pin-worms produce convulsions and epilepsy is erroneous.

CHAPTER XXV

DISEASES OF THE RESPIRATORY TRACT

Acute Nasal Catarrh—Coryza

Acute coryza is a very common affection in infants and young children. That it is due to an infection there is no doubt; neither is there any doubt that it is highly contagious.

If one child is put in a ward in close contact with other children they will usually contract the disease. A nurse or mother with an acute coryza should take every precaution not to infect the baby. The mother should not kiss or snuggle the baby while she has a coryza, and she should wear several thicknesses of gauze over her mouth and nose when she is nursing the baby, such as a surgeon wears during an abdominal operation.

The beds in a child's ward should be at least six feet apart, in order to prevent cross infections.

An infant with acute coryza will usually have some fever, and there is especial difficulty in nursing owing to obstruction to breathing through the nose. The result is that the baby gets insufficient food and loses weight, probably as a result of insufficient food as well as from the infection.

Treatment.—Adrenalin ointment used in the nose every two or three hours will usually shrink down the swollen mucous membrane so that some air will pass through. Certain drugs may sometimes be combined with the adrenalin to advantage.

Complications.—In many cases of acute coryza the inflammation does not limit itself to the nasal passage, but the postnasal space is also involved. This space is particularly rich in lymphatics and as a result the glands on the sides of the neck, cervical and postcervical, are often enlarged. If the infection is severe enough, these glands may break down and form abscesses, which may have to be opened and drained. Extension

of the inflammation from the postnasal space to the Eustachian tubes and middle ear, or mastoid, is common. Infants suffering from an acute coryza should be kept indoors. The temperature of the room should be uniform—about 70° F.—and the air should be kept moist with a steam kettle, to which some tincture of benzoin may be added. This, in addition to the adrenalin ointment, is all that is usually needed. No irritating sprays should be used.

FIG. 95.—Front view of adenoid face. Mark the open mouth and broad-bridged nose.

ADENOIDS

The lymphoid tissue in the vault of the pharynx is usually known as the third tonsil. When this lymphoid tissue becomes enlarged so as to produce obstruction to nasal breathing a child is said to have adenoids.

An enlargement of this tissue may occur at any time during infancy or childhood. It is not infrequent to find at birth, or soon after, the postnasal space so filled with lymphoid tissue that the baby cannot breathe through the nose or nurse properly until the obstruction has been removed. In more than half the cases there is an accompanying enlargement of the pharyngeal tonsils. The symptoms of adenoid enlargement are usually characteristic. The child breathes through the mouth instead of the nose, or it may breathe partially through the nose when awake, but when asleep the mouth is always open. Snoring is the usual accompaniment.

MENTAL APATHY.—In advanced cases, particularly in older

children, where this condition has persisted for a considerable time, the face has an idiotic appearance. The mental processes become sluggish and the child is frequently sent to the physician by the school nurse for examination (Figs. 95 and 96).

Shape of the Face.—As a result of this improper breathing

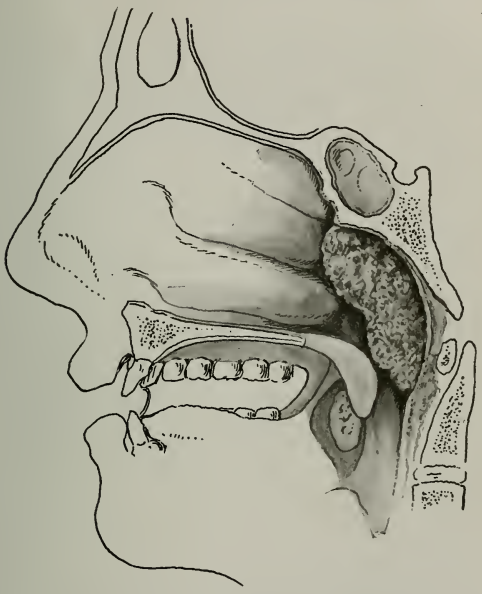

Fig. 96.—Diagram showing position of adenoid tissue.

there is frequently a deformity of the face and mouth, as well as of the chest. In case of a combination of mouth-breathing and rickets, the deformities are especially marked and are apt to be more or less permanent.

Cough Due to Adenoids.—Children with adenoids are apt

to suffer from a chronic cough due to pharyngitis as a result of the mouth-breathing. Attacks of asthma in susceptible individuals are prone to be markedly exaggerated by adenoids. I have not infrequently seen the asthmatic attacks entirely disappear when the adenoids were removed.

Deafness.—The fact that adenoids often obstruct the openings of the Eustachian tubes is a frequent source of progressive deafness in children. The adenoids interfere with the drainage from the tubes and in case of postnasal infection an extension of the inflammation to the middle ear is common. A chronic discharge from the ear will frequently cease as soon as the adenoids are removed.

Operation.—The presence of adenoids is such a prolific source of trouble, and their removal so simple and attended with so little danger, that operation, unless there is some special contraindication, should always be recommended. After the removal of adenoids, it is well to use some simple antiseptic solution, such as 10 per cent. argyrol, to be dropped through the nose when the head is well back, so that it will run into the postnasal space, until the raw surface is healed.

After-care.—In case of any infection following the operation, nasal irrigation with normal salt solution should be used frequently. The head should be well tipped forward and the fluid allowed to make the circuit, going in one nostril and coming out through the other.

Earache—Abscess of the Middle Ear—Mastoiditis

Earache is a common affection in children. Catarrhal inflammations of the nose and pharynx are very apt to extend to the middle ear, producing also an inflammation of the drum membrane.

The condition is attended with severe pain. When a baby cries severely as if in pain, when the digestive tract appears to be in order, earache should always be thought of. If present, the dropping of some warm oil or glycerin into the ear will

usually relieve the pain. If, however, in spite of this simple treatment, the pain persists and there is also attending fever, the physician should be called and an examination of the ear made with a speculum and reflector. Accumulation of fluid in the middle ear is common following all forms of inflammation of the nose and throat.

Middle-ear Abscess.—A large percentage of middle-ear involvement is due to infected adenoids. This may consist of serum or pus. If of serum, it may absorb or be discharged back into the throat without perforating the drum. If of pus, it is liable to continue to accumulate until it perforates through the drum. During the time before the drum perforates there is liable to be considerable pain and fever, depending upon the kind and severity of the infection. In infants many abscesses of the middle ear perforate the drum of themselves without surgical interference.

Drum Puncture.—A child with a middle-ear inflammation should always be under the care of a physician and the condition watched carefully, for at any time it may be necessary to puncture the drum. After the drum has been perforated and the ear is discharging freely it is only necessary to keep it clean. Irrigation is not so much in vogue for this purpose as formerly. The ear canal should be wiped out with cotton and most ear specialists now prefer to introduce a small lamp-wick drain into the entrance of the canal, to be changed frequently. In order to prevent the skin in the lower part of the ear from becoming infected, it should be kept clean with a 50 per cent. alcohol solution and then smeared over with vaseline, lanoline, or oxide of zinc.

Medication should only be introduced into the ear canal under the direction of the physician. After the ear has stopped discharging the hearing function should be tested, as the removal of adenoids or the inflation of the Eustachian tube may be necessary to prevent deafness.

Involvement of the Mastoid.—In a certain percentage of

cases of middle-ear infection, particularly after the first year, the mastoid also becomes involved. Any redness or swelling behind the ear should be immediately reported to the physician, as an acute inflammation of the mastoid usually requires prompt surgical interference.

Catarrhal Laryngitis and Spasmodic Croup

Laryngitis is frequently the result of an extension of a catarrhal inflammation from the nose and pharynx. The disease is usually manifested by hoarseness and cough. In case the inflammation is severe the cough may be almost incessant.

Spasmophilia.—Some children, particularly those of the spasmophilic diathesis, are prone to spasm of the larynx whenever there is any irritation of the mucous membrane in the upper air passages. These children have a peculiarly hoarse cough, sometimes with marked narrowing of the laryngeal opening, and, as a result, more or less difficulty on inspiration.

Laryngeal Spasm.—A laryngeal spasm may occur in these children when no inflammation is present. Formerly a laryngitis accompanied by spasmodic croup was confused in the public mind with membranous croup, which we now know to be diphtheria.

Differentiation from Membranous Croup.—Although the two conditions are entirely different, there is sometimes some difficulty in determining whether a croup is spasmodic in character or whether there may not also be a diphtheretic membrane present.

An ordinary spasmodic croup is usually transient in character and rarely lasts more than a few hours, at the longest. It is relieved by antispasmodics, such as syrup of ipecac, given in sufficient doses to produce vomiting (15 to 60 drops).

Steam Tent.—A steam tent, made by directing the steam from a tea-kettle under a sheet thrown over an ordinary child's crib, will usually relieve spasmodic croup. (Tincture of benzoin, 1 teaspoonful to a pint of water, may be added with benefit.)

(See Fig. 97.) A croup which persists for several hours after these simple remedies have been tried should be regarded as suspicious. A physician should be summoned at once and a culture made from the larynx.

Ice-bags.—A laryngitis, with or without an accompanying croup, is usually relieved much by the application of an ice-bag

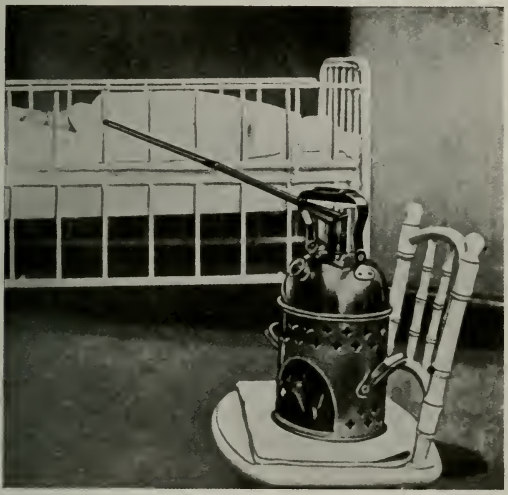

Fig. 97.—Steam kettle for use in bronchitis.

to the front of the throat, or, if that is not available, a cold compress may be applied.

Children with laryngitis and croup should be kept inside, out of the wind and dust, in a rather uniform moist atmosphere, until well.

Cough Mixtures.—Where the cough is severe and persistent, some of the mucilaginous cough mixtures to which some sedative has been added may be necessary.

Bronchitis and Asthma

Etiology.—Bronchitis is a common affection in infancy and childhood. In many cases the inflammation is simply an extension of a process begun in the upper air passages. Bronchitis may be due to a variety of organisms, the most common of which are the pneumococcus, influenza, staphylococcus, and the streptococcus.

Symptoms.—The symptoms will depend upon the character and severity of the infection, the resistance of the individual, and the extent to which the smaller bronchi are involved. In the simple forms there is probably little, if any, involvement of the smaller bronchi, and many times the inflammation is limited to the larynx, trachea and large bronchi. There is usually some rise of temperature (100°–101° F.), but there is little interference with breathing, except when the cough is especially troublesome, which is usually due to the accompanying laryngitis. Many children are prone to attacks of bronchitis and with every extreme change in the weather, or trifling exposure, they begin to cough.

Predisposing Causes.—Delicate children and those with adenoids, tonsils and rickets are particularly prone to attacks of bronchitis. Over-heated houses, and particularly steam-heated flats, where the temperature often fluctuates between 75° and 80° F. during the day, and is allowed to go down to nearly the freezing point at night, are common predisposing causes of bronchitis.

As a preventive measure, the general health of the child should be maintained at as high a point as possible by proper feeding and an out-door life. Extremes of heat and cold should be avoided. The temperature of the house should be regulated by a thermostat and should never be above 70° F. A proper amount of moisture in the air should be maintained by vessels of water attached to the radiators.

Cool Sponging.—Cool sponging of the chest and neck, morn-

ing and evening, with a vigorous rub, will do much to render these children less sensitive to changes in temperature.

Adenoids a Cause.—When there are adenoids they should be removed, and the child taught to breathe through the nose, doing daily some systematic deep breathing and at the same time exercising to develop the chest. Many of these children have small, flat chests and have little lung capacity. With systematic training the lung capacity may be doubled in a short time.

For the acute attacks, compresses to the chest, hot or cold, as indicated in the individual case, inhalations of medicated steam, and the simple cough mixtures are sometimes indicated.

Asthma

Asthma is a spasmodic affection of the bronchi, resulting in dyspnœa, particularly in expiration. There is considerable distress, with a feeling of suffocation. There is often marked cyanosis. The breathing, and especially the expiration, is accompanied over the entire chest by a wheezy, crowing sound, as a result of the effort on the part of the chest muscles and the diaphragm to force the air from the vesicles through the narrowed bronchi.

According to many authorities, pure spasmodic asthma in young infants is rare. The asthma usually accompanies and is preceded by a bronchitis. Infants with exudative diathesis (that is, those prone to skin affections such as eczema) are particularly prone to attacks of asthma.

Adenoids as Cause.—Adenoids are a common exciting cause of asthmatic attacks in susceptible children. These are difficult cases, and in the northern climate, where changes in the weather are sudden and extreme, they are liable to recur and recur, in spite of the best efforts to prevent. Such children are frequently much benefited, and sometimes permanently cured, by spending a winter or two in the South of Florida or California, where they can live out of doors the entire time.

For the attacks, inhalations of some of the antispasmodics may have to be used.

Practically all of the patent asthma cures are only palliative and consist of drugs well known to every physician.

Influenza, La Grippe

Influenza is an acute infectious disease due to the influenza bacillus first described by Pfeiffer in 1892. The disease is highly contagious and has a disposition to occur in wide-spread epidemics.

In many cases it begins with a catarrhal inflammation of the respiratory tract; this may be mild or severe, not uncommonly extending to the bronchi or to the alveoli of the lungs, producing pneumonia. The inflammation may extend from the nasal passages into any of the adjoining sinuses, so that involvement of the middle ear, mastoid, antrum, and frontal and ethmoidal sinuses, are common complications. Enlargement of the cervical lymph-glands is exceedingly common. Involvement of the digestive tract is frequent, vomiting and diarrhœa being a common accompaniment. Meningitis as a result of infection from general circulation or extension from the ethmoidal or mastoid sinuses is not uncommon.

The disease runs an extremely variable course, depending upon the severity of the infection, the resistance of the individual, and the character of the complications. The temperature may make wide excursions, varying from 99° to 106° during the 24 hours. Marked nervous symptoms are usually present, the most common being headaches, stupor, delirium, and, in young infants with spasmodic diathesis, convulsions. Fresh air is one of the first essentials. If there is marked involvement of the respiratory tract, the air should be warm and moist; when the air is cold, the coughing is increased. Inhalations of steam and tincture of benzoin (one teaspoon to one pint of water) are often followed by marked relief.

When the digestive tract is involved the food must be much

restricted. When cow's milk is vomited or when it is found in the stools, improperly digested, it should be either entirely eliminated for a few days or given much diluted. When the temperature is high and the child is restless or delirious, cool packs of alcohol and water or cool sponging will frequently be followed by improvement of all the symptoms.

There is a marked tendency to relapse even after the temperature has been normal for some days. Convalescence is frequently slow and there is liable to be more or less anæmia and a lack of vitality for some time. Nutritious food is of vital importance. Patients should be gotten out of doors as soon as possible, although in the northern climate in winter it is sometimes difficult to decide just when it is safe to take young children out of doors, especially if there has been a complicating pneumonia. Many of these cases are immensely benefited by a trip to the country or to the seashore where they can be out of doors during the entire twenty-four hours. Where the cough persists and the vitality does not soon return a critical physical examination should be made by the physician, having in mind the possibility of tuberculosis. Complications, such as pneumonia and mastoiditis, will be taken up later under their particular headings.

Bronchopneumonia

Bronchopneumonia is a frequent and serious affection of infants and young children. It is particularly prone to attack those infants whose vitality for any reason has been reduced. It is a common complication of the acute contagious diseases, whooping-cough and measles, furnishing many of the serious and fatal cases.

Etiology.—The disease is due to a variety of organisms, pneumococci, streptococci, and the influenza bacillus being the common ones found in the sputum of these cases. The disease is known under various other names, as catarrhal pneumonia, capillary bronchitis, and lobular pneumonia.

The disease frequently begins as a bronchitis and extends into the small bronchi and air vesicles, setting up an inflammation with more or less exudate, which partially fills these portions of the lungs, resulting often in serious curtailment of lung space, resulting in marked dyspnœa. The temperature is variable, usually of a remittent character (Fig. 98).

Duration.—The disease under favorable conditions is liable to last several weeks. The temperature usually falls gradually

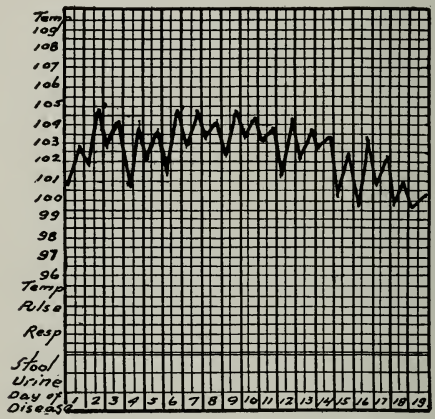

Fig. 98.—Temperature curve in bronchopneumonia.

by lysis in contradistinction to lobar pneumonia, which usually ends suddenly by crisis.

Exacerbations.—During the course of the disease there are liable to be marked exacerbations. The patient will seem to be getting on well, the temperature gradually becoming lower, with general betterment of all the symptoms, then the temperature will suddenly shoot up again and the general condition may become worse than before. These exacerbations are caused undoubtedly by new areas of involvement in the lung.

Lung Areas Involved.—It is not uncommon in bronchopneumonia to find areas of consolidation which may involve a considerable portion of one or more lobes. Many of these are mixed infections and are really both lobar and bronchopneumonia combined.

Nursing.—The proper nursing of these cases is the most important element in the treatment. The essential thing is to maintain in every way the vitality of the patient to enable him to overcome the infection.

Diet.—In young infants the food should be breast milk; for older children, milk and buttermilk. Concentrated gruels with fruit juices make an excellent combination.

Care of the Mouth and Nose.—The mouth and nose require special care. The teeth and tongue, which become covered with dried secretion, should be kept scrupulously clean by gentle brushing with some mild alkaline and antiseptic solution, such as Seiler's or Dobell's solution. The nose, where there is much secretion, should be douched at least morning and evening by means of a normal salt solution. In some cases liquid albolene dropped into the nose when the head is well back will result in keeping the nasal passages reasonably free from accumulated secretions. This is best done by using a nasal irrigator with a blunt point. The head should be tipped well forward over a dish and the solution allowed to run in one nostril and out the other. In the interval, in order to keep the nasal passage open, some simple ointment, such as adrenalin, to which some camphor and menthol have been added, will be of great benefit in preventing crusts from forming. When cleanliness in the nose and mouth is not practised in these cases, reinfection of the lungs may occur over and over again, and, in addition, severe general poisoning from absoption, thereby greatly lessening the chances for recovery.

Sponging.—When the temperature is high and there is marked restlessness, sponging with tepid water and alcohol will improve the condition. Thick pneumonia jackets should never

be used in these cases; they simply keep up the temperature by preventing the necessary loss of heat. A woollen shirt, which can be easily removed, is all that is necessary in the way of clothing. Applications in the way of compresses (one-half alcohol, one-half water), which may be indicated during the course of the disease, may then be made and removed as required.

After one attack of bronchopneumonia the patient is much more susceptible to subsequent attacks. Children should spend the summer in the open, and if possible in the pine woods, and if the finances of the family will permit, the following winter should be spent in the South. A nutritious diet, with the addition of cod-liver oil in cases where it can be tolerated, will be an essential part of the program in the convalescence of these cases.

Lobar Pneumonia

Etiology.—Lobar pneumonia is a frequent disease, affecting children of all ages. It is much more common in infants than is generally conceded. The disease is due to the pneumococcus. It would therefore be more correct to call the disease a pneumococcus-pneumonia instead of a lobar pneumonia, as frequently the disease does not affect a whole lobe, but only a portion of a lobe, or portions of several lobes at the same or different times. The characteristic thing which marks the disease as being of pneumococcic origin is its typical course. The course is frequently identical with that in adults.

Initial Chill.—The onset is usually sudden, beginning with a chill, or in young children this may take the form of a convulsion. The temperature becomes suddenly elevated, and there is usually a short cough.

Character of Respiration.—The respiration is superficial, more rapid than normal, and at the end of inspiration there is frequently a short grunt. If the pneumonia is limited to one side there is usually some noticeable lack of expansion of the affected side. The temperature remains high, with slight morning and evening remissions, and the pulse and respirations are

usually correspondingly increased in frequency. The respirations may be increased out of proportion to the temperature. In young infants the breathing is largely abdominal, so that it is somewhat difficult to register the frequency except by close inspection.

The face is usually flushed and one cheek is liable to be much more so than the other. Herpes on the lips is the rule.

The tongue is usually dry and coated, but there may be surprisingly little difficulty with the digestion, especially if the baby is breast-fed. It will usually be satisfied with small amounts of food, and if over-fed the stools are liable to be green and curdy. There is usually great restlessness, often with muttering delirium.

The Crisis.—The disease usually runs a typical course of from 5–9 days, sometimes longer and occasionally shorter, and ends suddenly by a crisis, the temperature within a few hours dropping to normal or even slightly below (Fig. 99). After a few hours there is liable to be a slight rise to 99°, or perhaps 99.5° F., after which it remains normal, or almost so. With a drop in the temperature there is also general improvement in the other symptoms; the respirations, which have been perhaps 40 to 60 per minute, drop to 25 or less, and the pulse, instead of running at 140–160 per minute, is found to be soft and almost normal in frequency.

The disease has run its course and has formed its own antitoxin.

Pseudocrisis.—Occasionally it happens that the sudden drop in temperature was not a real crisis but a pseudocrisis, and is followed after a few hours by a sudden rise in temperature, which may persist for several days with as severe symptoms as before. It will usually be found that such a drop in the temperature is followed by a new involvement in the lung, either as an extension from the original consolidation, or in another lobe, or even in the other lung.

Pneumococcus-pneumonia (lobar pneumonia) is a self-

limited disease, but there is no other disease which runs such a short and critical course.

Treatment.—There is no doubt that many cases of pneu-

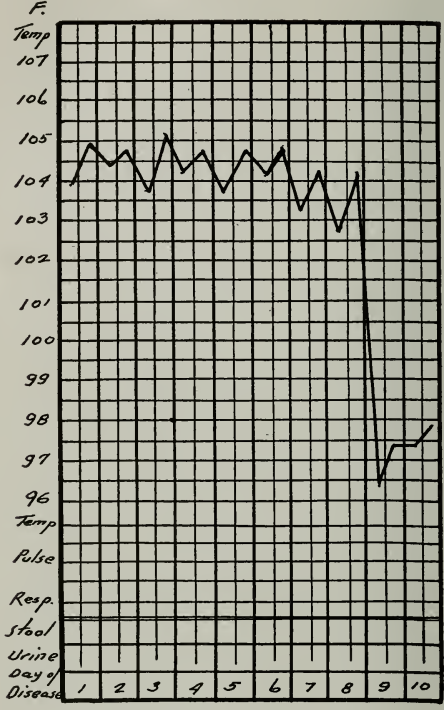

Fig. 99.—Temperature curve in lobar pneumonia.

monia are over-treated. Enough should be done for the patient, but not too much. An abundance of fresh air should always be allowed patients with pneumonia. Young infants and chil-

dren should not be subjected to zero or sub-zero temperature. If infants when normal tolerate extreme cold badly, they will hardly tolerate it better when suffering with pneumonia.

Pneumonia Jackets.—Pneumonia jackets of several layers of cotton and oiled silk should never be worn in cases where the temperature is running high, as they simply serve to keep the temperature higher.

Alcohol Compresses.—A much better appliance, which will control the temperature within certain limits and make the patient much more comfortable and less delirious, is an alcohol and water compress applied around the chest, one-third alcohol and two-thirds water, covered with a woollen blanket (Fig. 100). The compress may be applied warm or cold, as indicated. The compress, which may consist of a bath towel, may be wet occasionally without removing it. It will be found that children resent sponging with cold water. The compress relieves the necessity for sponging and is much more effective. These children should be given water freely. The bowels should be kept open if necessary, but if normal should be left alone.

Care of Mouth.—The mouth and nose require special care and should be kept as free from secretions as possible without annoying the patient constantly, often to his detriment.

Pleurisy.—Lobar pneumonia is usually accompanied by pleurisy. This is a complication which is usually painful, sometimes producing marked interference with the breathing. It is occasionally necessary under these conditions to strap the affected side with adhesive plaster strips.

Pleural Effusion.—A pleural effusion occasionally follows pneumonia. The fluid may be simply a serum which may either absorb, or, if large in quantity, may have to be withdrawn by aspiration.

Empyema.—A more serious and usual complication is the formation of pus in the pleural cavity, a condition known as empyema. After the pneumonia is apparently over there is a sudden rise in temperature, which is persistent and of a remittent

character, usually quite different from that during the course of the pneumonia. The affected side is usually fixed and the physical signs are those of fluid instead of consolidation. In

FIG. 100.—Manner of applying a compress to the chest. This should be covered with flannel.

young infants the pus is usually withdrawn by aspiration. This may have to be repeated several times before the accumulation ceases to return. In older children a resection of a rib is usually

made at the lowest point of the cavity. Some form of drain is usually introduced and maintained until the pus ceases to come from the pleural cavity, when the opening is allowed to close. The dressing should be changed sufficiently often to absorb all discharges. The skin should be washed with alcohol after each dressing and afterwards smeared with some simple ointment, such as vaseline or oxide of zinc, to protect it from the discharges.

Pleurisy

Pleurisy in young infants and children is comparatively rare as a primary disease. It most commonly comes as a complication of pneumonia as described under lobar pneumonia or as a secondary tuberculous infection.

If tubercular, the treatment will be that of tuberculosis, and if there is a large amount of fluid it may have to be drained off by aspiration.

CHAPTER XXVI

DISEASES OF THE BRAIN AND CENTRAL NERVOUS SYSTEM

Obstetrical Paralysis

Many of the nervous affections from which new-born infants suffer are due to accidental injuries at birth. In a difficult delivery it is often necessary to apply traction to the extremities, resulting not infrequently in injury to the nerve trunks, causing paralysis of the muscles supplied by these nerves (Fig. 101). Fortunately, many of the cases of obstetrical paralysis are temporary in character, and result after a few weeks or months in perfect recovery.

Fig. 101.—Facial paralysis due to injury at birth.

Injury to the brain or its membranes, owing to compression in the pelvic canal or to the application of forceps, is more serious and frequently results in a meningeal hemorrhage and in some degree of paralysis of the muscles controlled by the area pressed upon. Nervous symptoms, such as convulsions, frequently develop in the new-born, and it is impossible for the time being to determine whether they are functional or whether they are due to some injury to the brain.

Little's Disease.—There are other affections of the brain,

such as general spastic paralysis (Little's disease), microcephalus and mongolism, which are undoubtedly due, many times, to some intra-uterine injury, or perhaps to injury during birth, where the condition is not recognized until the child is several months old (Fig. 102). A nurse who is a keen observer will usually have noticed in these children before many months

FIG. 102.—Little's disease (spastic paralysis).

that there is something wrong either in the character of the muscular movements (rigidity) or in the mentality, and will call the physician's attention to the fact.

A baby who at the age of six months does not grasp objects with its hands, and stick them directly into its mouth, is not normal.

When several incoördinate attempts must be made in order to grasp an object, the fingers being in extension, and then often imperfectly closing, the object being carried to the mouth in a zig-zag manner, Little's disease should be suspected. The legs and feet in these cases may be quite as spastic as the arms and hands, and it will be noticed that any attempt to separate the thighs results at once in a spasm of the muscles. In many cases there is also a spastic condition of the muscles of the face and jaws, so that later mastication of the food is difficult.

Although these cases are incurable, much can be done by proper education of the muscles and by the use of appliances to improve their usefulness. Later on surgical measures, such as transplantation of certain tendons, may greatly improve the ability of getting around.

Unless properly advised many of these cases get into the hands of charlatans, who take the parents' money and promise results which they cannot obtain.

Microcephalic Idiots

As a rule these cases cannot be diagnosed at birth. For some reason there is an arrested development of the brain, and after a few months it will be noticed that the head is smaller than normal. The sutures and fontanelles are frequently entirely closed at the age of six months. It was thought formerly that the arrested brain development was due to premature closure of the sutures and fontanelles. It is now practically certain that in the majority of cases at least the reverse is the case.

There is little, if any, mental development in most of these cases, and many of them are subject to convulsive seizures of various degrees of severity (Fig. 103).

Congenital Hydrocephalus—"Water on the Brain"

This condition is characterized by an accumulation of fluid in the ventricles of the brain. A form in which the fluid collects external to the brain, between the membranes, is rare and will not be discussed here.

Chronic hydrocephalus is usually congenital, although it may follow basilar meningitis.

The head gradually increases in size, the edges of the sutures are separated further and further, the fontanelles becoming larger. In some cases where the child lives to be several years of age the head reaches an enormous size (Fig. 104). The amount of fluid which accumulates in the ventricles varies from

FIG. 103.—Microcephalus. Child two and one-half years. Circumference of head, 13 inches.

several ounces to several pints. Holt reports a case, which died at four months, from which five pints of fluid were removed from the brain.

It is surprising how long many of these cases live and continue to be fairly normal in many of their functions. Some of them are extremely bright. One child, now three years old, with a head circumference of 28 inches, is unusually intelligent for her years. Many of them are backward mentally, and some are idiotic.

The symptoms vary greatly, depending upon how early the condition began and the rapidity with which the fluid accumulates. The great majority of these cases die before they reach the end of the first year. "It is comparatively rare that a case of congenital hydrocephalus reaches the seventh year." A few reach adolescence, the process having after a time ceased to develop further. Some cases go through life with a markedly enlarged head, and usually with a mental condition somewhat impaired.

Treatment.—If there is a possibility of syphilis being the

Fig. 104.—Chronic internal hydrocephalus in child twelve months of age.

cause, active antisyphilitic treatment should be begun early. Draining the ventricles into the subarachnoid space has been tried with varying degrees of success, but so far the mortality has been large and the results in the cases which survived the operation not brilliant.

Mongolism—Mongolian Idiots

This represents a class of idiots which have the peculiar faces of the Mongolian (Fig. 105). The condition is often mistaken for cretinism, although there are few symptoms which are sufficiently similar to warrant confusion. Like other forms of

FIG. 105.—Mongolian idiot.

idiocy, it is of various grades. In the milder forms there is some possibility of mental development, although slow and always limited.

Nurses should never suggest the possibility of idiocy or

feeble-mindedness to the parents. No one but a physician should take such a responsibility.

Malformations of Brain and Spinal Cord

There are several forms of malformation of the brain and

Fig. 106.—Spina bifida in dorsal region.

spinal cord which are due to defects in the skull or vertebræ, allowing a portion of the brain or spinal cord or their membranes to protrude through the opening.

In *meningocele* there is a protrusion of the membranes of the

brain through an opening in the skull or spinal column. The tumor is usually in the form of a sac filled with fluid.

In *encephalocele* there is, in addition to the membranes, a protrusion of some of the brain substance.

SPINA BIFIDA

There is a malformation of the vertebral canal with a protrusion of some of the membranes through the opening, usually

FIG. 107.—Spina bifida in lumbar region.

filled with spinal fluid similar to meningocele (Figs. 106 and 107). The prognoses in these cases will depend largely on whether a portion of the cord or nerve trunks is incorporated in the sac. If so, the paralysis is usually permanent, with little or no hope of relief by surgical or any other means. Even in favorable cases, operation occasionally is followed by internal hydrocephalus. The skin over the mass is often very thin and great care must be taken lest there be an abrasion and the spinal fluid escape. An ascending infection of the spinal meninges is practically sure to follow. A soft cotton ring surrounding the tumor will serve to protect it from injury.

Convulsions and Epilepsy

Convulsions are among the most common nervous affections of infancy.

There is a certain type of children who have a constitutional predisposition to convulsions. A child of this type is said to have "the spasmodic diathesis" (spasmophilia), meaning that it has a predisposition to convulsive seizures. Such children are prone to have a convulsion with an attack of indigestion, or with the onset of any of the infectious diseases.

Convulsions are liable to occur in any child, as a result of infections of the brain and meninges or from intracranial pressure.

When a child is suddenly seized with a convulsion, it is usually impossible to say whether it is due to functional causes or whether it may not indicate the onset of one of the infectious diseases, or a meningitis. If the convulsion is due to indigestion, which is the most common cause in susceptible individuals, it will be relieved after the intestinal canal has been cleared out, and after sufficient time has elapsed to eliminate the toxic agents and allow the nervous system to regain its equilibrium.

Sedatives.—Sedatives, such as chloral, bromide, or sometimes chloroform, may be necessary to control the convulsive seizures. Plunging these cases at once into hot water, and at the same time keeping the head cool, is often effective. Great care must be taken lest the water be too hot and result in a serious burn. If the temperature is high, the child should be rolled in a cool pack, made by wringing a bath towel out of cool water to which some alcohol may be added.

In many cases the convulsion which comes with the onset of one of the acute infections really corresponds to the initial chill in the adult, and may or may not be repeated.

Epilepsy and Spasmophilia.—When a child has a convulsion at intervals of several weeks or months, and without any apparent provocation, there is always some fear in the minds of

the parents that the condition may be epilepsy. That, of course, is quite possible and will require skilful and close analysis to determine. There are, however, certain characteristic muscular reactions in spasmophilia to electrical and mechanical stimuli, by which the two conditions may often be differentiated.

The convulsions which accompany the different forms of meningitis and brain injuries will usually be associated with other characteristic symptoms.

Feeding.—Children who are prone to convulsions should be fed and handled with the greatest care. The parents, one or both, are often neurotic and a history of convulsions in infancy can frequently be obtained. Many of these children are overfed with cow's milk. The milk should be much reduced and a mixed diet given as soon as possible. Albumin milk, from which most of the salts have been removed, is an ideal diet in these cases, supplemented as soon as possible with other food. In some cases the cream of the milk will have to be largely eliminated. The fat may be supplied to advantage by giving cod-liver oil in proper amounts. The addition of small doses of phosphorus is often advisable. These children should live in the open air and be removed from all excitement. If their physical condition can be markedly improved, the nervous irritation will usually improve also. It must also be borne in mind that most of these cases have inherited a nervous temperament, and although much may be done in improving their physical condition and in teaching them self-control, the temperament is there and will not be fundamentally changed.

EPILEPSY

"Epilepsy may be described as an unstable condition of the nervous system, resulting at intervals in an explosion of nervous energy, convulsive movements of the muscles, and temporary loss of consciousness." The attacks come at irregular intervals, many times without any apparent exciting cause, although undue excitement and indigestion are apt to precipitate them. The

condition is chronic, and, although it may be modified somewhat, lasts throughout life.

According to Gowers, 12 per cent. of the cases begin during the first three years of life, and 46 per cent. between ten and twenty years.

Heredity plays an important rôle in producing the disease, and, according to Gowers, about one-third of the cases have a history of either epilepsy or insanity in the family. In an epileptic seizure care should be taken that the child does not injure himself. The nurse should watch for involuntary passage of urine and fæces, as this often occurs in epilepsy and may be an important point in the diagnosis.

Meningitis

Meningitis is an inflammation of the membranes covering the brain, most commonly affecting the pia mater.

Meningitis may be caused by a great number of organisms, and in fact is frequently secondary to infections in other parts of the body.

The most common organisms producing meningitis are: the tubercle bacillus, influenza bacillus, pneumococcus, staphylococcus and streptococcus, diplococcus (meningococcus), and *Spirochæta pallida* (syphilitic meningitis).

Symptoms of a beginning meningitis are extremely varied, depending upon the character and severity of the infection and the portion of the brain first involved.

Sooner or later, in addition to the common symptoms of infection, indisposition and fever, there are others which are the direct result of the meningeal condition, such as vomiting, headache, strabismus, inequality of the pupils, rigidity and paralysis of certain groups of muscles together with a modification of the reflexes.

cerebrospinal meningitis (meningococcus meningitis)

This form occurs occasionally in epidemics; the majority of cases, however, occur sporadically. This is the one form of

meningitis for which we now have a specific (Flexner's serum), so that it is important in all cases to be able to say definitely whether we are dealing with the meningococcus.

Lumbar Puncture.—In order to determine, it is necessary to make a lumbar puncture. Some fluid is drawn from the

Fig. 108.—Lumbar puncture.

spinal canal *and the character of the infection determined by culture and microscopic examination. In case the organism is found to be the meningococcus, Flexner's serum should be injected at once.*

Technic.—A lumbar puncture is made by introducing a

needle made for the purpose usually between the fourth and fifth lumbar vertebræ (Figs. 108). The entire skin at the lower third of the back and extending around in front beyond the crest of the ilium should be cleansed, as these points are used by the operator as landmarks in locating the proper place for puncture.

In addition to sterile needles, several sterile test tubes plugged with cotton should be provided to catch the serum which is withdrawn.

Anti-meningococcic Serum.—This serum is usually introduced through the same needle. The amount of serum introduced usually depends upon the amount of fluid withdrawn. This is

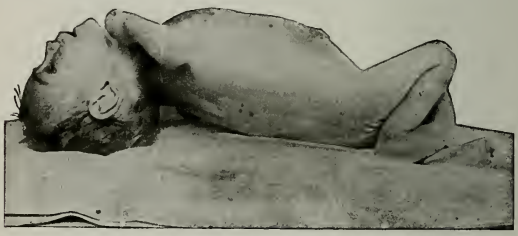

Fig. 109.—Opisthotonos.

introduced daily, until the symptoms show improvement. When the serum is used early, 75 per cent. of these cases recover. The serum is absolutely useless in all other forms of meningitis.

Tuberculous meningitis is practically always fatal. The mortality of all other forms is high, but there are undoubtedly a certain per cent. of recoveries.

Infantile Paralysis—Poliomyelitis

Infantile paralysis is now recognized as an acute infectious disease, characterized by more or less general symptoms and a tendency to attack the nervous system, often producing paralysis of certain muscles or groups of muscles. The disease occurs

sporadically, but during the past few years it has been occurring in wide-spread epidemics. There is hardly a locality in this country or in Europe which, during the past ten years, has not had an epidemic of this disease.

The disease shows a particular disposition to attack children

FIG. 110.

FIG. 111.

FIG. 112.

FIG. 110.—Drop-foot resulting from infantile paralysis.
FIG. 111.—Deformity from infantile paralysis.
FIG. 112.—Same case after one year's treatment. (Minnesota Hospital for Crippled and Deformed Children.)

under three years of age, although no age is exempt. "There is evidence that it may occur during intra-uterine life."

THE ORGANISM OF POLIOMYELITIS.—The infectious organism has been isolated by Flexner and is described by him as a minute globular body which can be seen only by the highest power microscope. The virus is communicated from one person to another by contact. The disease may be spread by carriers, some of whom have been themselves previously affected, or by persons who have been in close contact with the disease. The organisms

are found mostly in the upper air passages. In the majority of the epidemic cases, the character of the disease is not known until the paralysis appears. The general symptoms are often those of an influenza. There are a number of forms described, depending upon which portion of the central nervous system is particularly attacked by the disease. In an epidemic, combinations of all the forms occur.

For the paralysis much can be done by exercises to prevent the atrophy of the muscles. In mild cases there may be complete recovery where the nerve centres have not been destroyed. Massage and encouragement to use the muscles so far as possible are the important factors. Later, where there is a tendency to contractions of the opposing muscles, braces and other appliances prescribed by the orthopedist are of great benefit in preventing deformities (Figs. 110, 111, and 112).

During the acute stage absolute rest should be enjoined. Massage should not be begun before the sixth week from the onset.

CHAPTER XXVII

RHEUMATISM AND ST. VITUS'S DANCE

Rheumatism

Articular rheumatism in children is much more common than was formerly supposed.

It is now regarded as an infectious disease, due to some specific organism, in all probability a streptococcus.

The disease is frequently secondary to other inflammatory conditions, such as scarlet fever and tonsillitis. In recent years, tonsillitis has been popularly regarded as the common cause of rheumatism. Recently, decayed and abscessed teeth are being also regarded as a possible, if not a frequent, source of rheumatic as well as other general infections. The symptoms of rheumatism in infants are often not so pronounced as in older children and adults. The involvement of the joints may not be so general and the temperature not so high, and there may be only one or two joints involved. The clinical picture, however, is generally quite plain.

Heart Involvement.—The frequency with which the heart becomes affected in rheumatism, even in apparently mild cases, makes it a serious affection. In many cases where there is no apparent heart involvement during an attack, later a lesion may be found. Too frequently, a heart lesion is discovered when general symptoms of broken compensation, shortness of breath, and œdema are already present. Examinations of the heart, therefore, should be made often, and the child taken to the physician at regular intervals for at least a year after the last attack. Children with rheumatism should generally be kept in bed for a much longer period than seems necessary to the family. During the acute stages the affected joint should be kept at perfect rest and wrapped in cotton wool.

Salicylates.—For local medication, wintergreen oil or some of the salicylate ointments are thought to be of benefit. When salicylates are given by mouth, they frequently cause derangement of the digestion. They should never be given on an empty stomach, and always well diluted. The bowels should be kept free with alkaline laxatives, such as Rochelle salts, and the diet should be of a simple character until convalescence is established. Water should be allowed freely.

Clothing.—The clothing should be of woollen, and this should be maintained even during the summer months, when the child is about, because of a marked tendency to copious sweating and the danger of subsequent chill. There is a marked tendency to recurrence. A winter spent in the South, on the sea-shore, where the children may be out of doors and still be warm, often works wonders in these cases where there is marked debility.

The most essential points in the prevention are the discovery and removal of the portals of entry of the infection.

Chorea—St. Vitus's Dance

"Chorea is an affection of the central nervous system characterized by involuntary incoördinate movements of the voluntary muscles, loss of power, and a lack of control of the emotions. There is a tendency to complete recovery." But, unfortunately, also to relapse.

Although the disease may affect children of any age, it is most common between the ages of seven and fourteen years. It is much more common in females than in males.

Relation to Rheumatism.—Although the cause of the disease is not known, there is probably a close relation between it and rheumatism. Of 111 cases investigated by Crandall, there was a definite history of rheumatism in 63.

Affections of the Heart.—Many of the cases suffer from more or less definite involvement of the joints and many have an accompanying endocarditis.

Children who are below par physically, who are under-fed and over-crowded at school, are particularly liable to chorea. Chorea may follow any of the contagious diseases and is said to be frequently associated with adenoids and large tonsils. These last, however, should probably be regarded only as predisposing causes.

Symptoms.—The first symptoms are usually attributed to habit or simple awkwardness. The child has difficulty in feeding itself, drops its spoon, fork or knife, for which it is usually scolded. The twitching gradually extends in severe cases to all the voluntary muscles, so that the child is practically helpless. Speech is often interfered with. The twitchings are increased by excitement and fatigue, but do not continue during sleep. Children with chorea are irritable, subject to fits of temper, and are liable to laugh or cry often without "rhyme or reason."

Course.—An attack of ordinary severity tends to recover in from six to ten weeks. It may last for months, and has a tendency to recur.

Treatment.—The nursing of these cases is of the greatest importance. They should be removed, if possible, from the family, and particularly from the other children in the family. They should be taken out of school, and all other work, such as music lessons, should be discontinued. They should not be scolded or ridiculed on account of the irregular movements, but should be handled firmly and not allowed to impose on those in attendance.

Rest in bed, a maximum of plain, nutritious food, removal from all worries and irritation, with the gradual resumption of physical exercise, are the prominent points in the treatment of chorea.

Cases of great severity may require restraint, hot baths, and sedative drugs.

Medication in the form of tonics, such as arsenic and iron, is much in favor with many physicians.

Habit Spasms

There are spasmodic movements of certain muscles, particularly those of the face, occurring usually in nervous children, which cannot be traced to any diseased condition and yet are extremely persistent and practically beyond the control of the will. These twitchings are frequently mistaken for chorea. They sometimes have their origin in a local irritation in the conjunctiva or in the mucous membrane of the nose, the twitching often persisting as a habit spasm after the original cause has quite disappeared.

It is important, therefore, at once to ascertain if possible the cause of any irregular muscular movements, for, if they once become fixed, they are liable to continue through life.

CHAPTER XXVIII

AFFECTIONS OF THE HEART

Affections of the heart are extremely common in children. Exclusive of the congenital conditions already described (page 16), there are a variety of others, both functional and organic, which are of varying degrees of importance. To the average individual any heart affection means "heart disease" and "heart disease" means a condition which sooner or later ends fatally. This, of course, is an entirely false idea, as there are many affections of the heart which are purely functional in character, and still others which, although organic, are capable of perfect recovery.

Functional Murmurs.—During the rapid growth of the child, functional heart murmurs are common. Following the acute infections, heart murmurs are especially common. They may be functional or organic—many times it is impossible, for the time being, to determine. Whatever the character of the affection, the care the child receives will often determine whether the recovery will be complete or whether the child will go through life with a crippled heart.

Inflammatory affections of the heart are divided into three classes, according to the part involved: Endocarditis—an inflammation of the lining membrane of the heart, including the valves; myocarditis—an inflammation of the heart muscle; pericarditis—an inflammation of the serous membrane covering the heart and reflecting back upon itself, forming the pericardial sac.

These conditions are liable to occur following the infectious diseases, and particularly such diseases as rheumatism, scarlet fever, diphtheria and measles. In acute diseases of the heart the myocardium is practically always involved, and in many cases there is a combination of all three forms.

Pericarditis.—In pericarditis the pericardial sac may become distended with fluid, resulting in great embarrassment to the heart action. Following the disappearance of the fluid, adhesions may form between the two surfaces of the pericardium, which may also later cause serious symptoms.

Management.—Children with heart affections, whether functional or organic, should be kept under proper restraint. I have repeatedly seen children with heart murmurs which were thought to be organic and probably permanent, entirely recover, with careful supervision and proper restraint from over-exertion. On the other hand, even children with organic lesions are coddled too much. The laying out of a regime for these children requires absolute co-operation between physician, nurse, and family.

It is of little use to send children off to play with other healthy children and caution them not to over-exercise. One might as well tell the wind not to blow. The only way to get results in these cases is to have them constantly watched; otherwise many of them will be permanently crippled who would otherwise recover.

In children with well-defined valvular lesions, their sojourn on earth will depend largely upon the care which is taken of the heart muscle. These hearts are always hard worked, and if an extra amount of work is thrown upon them the compensation breaks down and the child soon succumbs. If, on the other hand, these children are allowed only enough exercise to keep them in good physical condition, they may live useful, happy lives for many years and finally die from some other cause.

The first essential in the treatment of all acute organic heart affections is rest in the horizontal position, the time to be determined by the physician in charge. The mistake is usually made of allowing children with heart affections to get about too soon.

The heart complications of the contagious diseases will be considered in that connection.

CHAPTER XXIX

AFFECTIONS OF THE SKIN

Diseases of the skin are divided by Adamson into four classes: (1) eruptions due mainly to physical causes; (2) eruptions of parasitic or microbic origin; (3) toxic eruptions and eruptions of unknown origin; (4) congenital affections.

It is always difficult to keep this classification distinct one from the other, since not infrequently the presence of one operates as a predisposing element in producing another.

Eczema and the Exudative Diathesis

Eczema is a common affection in infants and children of all ages. The condition known to the laity as milk crusts is a common one in young babies, many of which are breast-fed.

Fig. 113.—Eczema of scalp with formation of crusts.

The exudate usually begins on the scalp as a scaly condition resembling dirt. If, however, an attempt is made to remove the scales with soap and water, or by vigorous rubbing, it will be found that the underlying skin is red, and after a few minutes has small drops of serum scattered over the surface. These soon become dry, forming small crusts (Fig. 113). If the process of removing is persisted in, or if the child is allowed to scratch—which it will do if it can, as the condition is extremely

itchy—the crusts become thicker and more general, spreading often to the forehead and cheeks and later to the hands, body, and lower extremities. In many cases the exudate begins on the face and never affects the scalp. After a time the serum under the crusts becomes infected with pus cocci, and there is added to the eczema a pus infection, resulting often in a general Impetigo contagiosa (Fig. 114). Owing to the pus infection there is often considerable fever, and the superficial glands, particularly the cervical, are liable to be much enlarged.

In most of these cases there is an underlying constitutional condition known as exudative diathesis. These children have a condition of the blood in which the eosinophile cells are greatly in excess of the normal. After the exudate has entirely disappeared from the skin in these cases it reappears again and again, many times without any apparent provocation. Overfeeding, particularly with fat, frequently results in an acute exacerbation, which is liable to persist, in spite of all local treatment, until the fat has been reduced.

Fig. 114.—Impetigo contagiosa.

Treatment.—The successful treatment of these cases, therefore, must be both local and constitutional. An important feature in the local treatment is to get the skin free from pus and then keep it clean. When the scalp is covered with crusts from which pus oozes upon pressure, the crusts must be removed, and the best way is by large dressings of normal salt solution, which are kept on until the scalp is free from crusts and any evidence of pus. The character of the medication will have to be determined by the physician in charge. Whatever the medication, the object is to keep the skin clean and free from

irritation, until healed. To do this, scratching and rubbing must be prevented. The condition is extremely itchy and the child has an uncontrollable desire to scratch the affected skin. The hands will have to be restrained. Splints applied to each arm, preventing the child from bending the elbow, will allow considerable freedom but prevent scratching the face. A simple form of splint is a pasteboard tube limiting the motion of the elbow. Hand mittens may be worn.

The most difficult thing is to prevent the baby from rubbing its face or head in the pillow or against anything which is available. A mask made from some fabric such as linen or cotton (Fig. 115) may often have to be applied. An ideal protection would be furnished by a mask resembling a base-ball mask, made of wire, which would admit of perfect cleanliness and protection, a condition wofully lacking in the ordinary cloth mask.

FIG. 115.—Face mask and arm splints for the treatment of eczema.

CLEANLINESS.—Children of the exudative type are particularly prone to eruptions of the skin under the diaper, which is irritated by contact with the urine and stool. These eruptions are of various characters and intensity and may frequently be complicated by infections from the skin organisms. To prevent such irritation the diapers should be changed as soon as soiled and the skin washed and powdered, and some simple ointment, such as oxide of zinc, used to protect the skin. These children are also prone to have eruptions in the folds of the skin, under the chin, behind the ears, under the arms, unless these folds are

kept scrupulously clean and free from secretions. Soaps should be used as little as possible in these cases. The irritated parts should be washed with water to which some borax has been added and then gently sponged dry, and a little stearate of zinc, or starch powder, dusted over the surface.

Hives—Urticaria or Nettle-rash

Urticaria is due either to some local irritation of the skin or to the ingestion of some toxic substance in the food, or to certain medicinal agents, particularly diphtheria antitoxin, causing a dilation of the capillaries in the skin and the production of wheals or raised blotches. The most common cause is probably the eating, in susceptible individuals, of such foods as strawberries, eggs, or shell-fish. The rash is more or less general and usually is accompanied by intense itching. Whenever pressure is made upon the skin, a red raised line appears in a few seconds, which may remain for several hours before it gradually disappears.

Prevention.—When children are known to have an idiosyncrasy to certain foods these in the future should be avoided.

For the active condition a thorough catharsis with castor oil or some other simple cathartic, and a diet for several days consisting largely of starchy food in some form, should be given.

For the intense itching, soda baths, or the application of carbolized vaseline in small quantities, will sometimes give relief. Where the itching is persistent in very nervous children, some sedative may have to be given until the toxic substances have been eliminated and the nervous system returns to the normal.

Chilblains

Chilblain is another common affection in children. It occurs on the extremities, most frequently the feet, as a result of exposure to cold. Some children are particularly susceptible to chilblains and suffer from intense itching during the entire winter, unless the feet are kept warm by warm stockings and overshoes. Tight shoes should be particularly avoided.

Birthmarks—Nævi

The term "nævus" is used in dermatology to indicate all congenital localized overgrowths of any of the elements of the skin. The most common varieties are the *vascular moles* or *pigmented nævi,* and the *port-wine mark,* besides many mixed forms.

The origin of birthmarks is unknown, but they probably have no connection with "maternal impressions." Many of the nævi are innocent, but some of the vascular forms have a marked tendency to spread. Under such conditions they should be radically destroyed by cauterizing with carbon dioxide snow, actual cautery, or by excision. Innocent small ones may be removed for cosmetic reasons. The large wine-colored spots are usually impossible of removal.

The following is a list of other skin affections occurring in children:

1. *Eruptions due to animal parasites,* such as scabies (itch); pediculosis capitis (head lice); eruptions due to fleas, mosquitoes, spiders, ants, etc.

2. *Fungous infections,* such as ringworm and favus.

3. *Microbic infections,* such as impetigo contagiosa, bullous impetigo, dermatitis gangrænosa, dermatitis exfoliativa, tuberculosis of the skin (lupus vulgaris), acne, eruptions of congenital syphilis.

4. *Toxic eruptions:* herpes febrilis, herpes zoster, erythema nodosum, erythema multiforme.

5. *Drug eruptions.*

6. *Vaccination eruptions.*

7. *Eruptions of unknown origin,* as pemphigus, psoriasis, pityriasis, scleroderma, alopecia (some forms).

For a description of the above named diseases, together with any others, the reader is referred to a standard work on diseases of the skin (Stellwagen or Crocker). The important thing for the nurse is to be able to recognize and isolate the contagious forms.

Vaccination

In order to render children immune from the infection of smallpox, they are inoculated with the cowpox (vaccinia). Formerly much of the virus was obtained from other children who had been vaccinated. It was found, however, that by this means such diseases as syphilis could be transmitted from one to another.

Source.—The virus is now obtained from an extensive vaccination of the flanks of healthy calves, the utmost precaution being taken to insure against any possible disease, such as anthrax or tetanus. All vaccine is tested on animals for possible pathogenic organisms, and the calves are killed and examined before the vaccine is put upon the market. The vaccine is mixed with glycerine and put up in capillary tubes, or on sterile celluloid or glass points.

Time for Vaccination.—Children should be vaccinated as a rule during the first six months. There is usually less reaction in a young child than at a later age.

Repetition.—The vaccination should be repeated every six or seven years, and oftener if smallpox is epidemic. Infants who are suffering from an extensive eczema should not be vaccinated until they are well, as an extensive vaccination eruption may occur over the entire body, such as I saw in one case abroad, with fatal result (Fig. 116).

Location.—Boys are usually vaccinated on the left arm at about the insertion of the deltoid muscle.

Girls, for cosmetic reasons, should be vaccinated on the leg, the outer aspect of the calf being the usual point chosen.

The skin should be washed with water and soap and then with ether. If alcohol is used the chances are less for a good "take." It should be thoroughly dried, as any alcohol which may remain is liable to destroy the virus.

Technic.—The skin is then scratched with a sterile needle or "point" until the epithelium is removed and the wound begins

to bleed. The vaccine should then be thoroughly worked in with the point or a sterile toothpick. A new method described by Dr. W. H. Hill consists in thoroughly cleansing the skin, as described above. A small drop of vaccine is then placed on the skin in the desired place, and a number of superficial punctures of the upper

FIG. 116.—General vaccination in a child with eczema.

layers of the skin are made with a sterile needle through the vaccine. The shield is then applied as above. The advantage of this method is the small chance of a mixed infection. The vaccine should be allowed to dry and then be covered with sterile gauze or shield. After four to six days a red papule appears. This is rapidly changed to a vesicle. There is an area of redness

which gradually extends around the vesicle until it reaches the size of a silver dollar, or larger. The lymphatic glands in the axilla or groin are liable to be considerably enlarged. For the first few days after the vesicle begins to form, there is a general feeling of malaise, and often considerable fever. There may be a general rash; this is sometimes a general erythema or is more often blotchy in character. After a few days it gradually fades and the general symptoms disappear. If the vaccination is performed on the leg, the local and general symptoms are liable to be more severe.

The vaccination, if clean, after a week gradually dries, forming a scab, the redness fades, and after a few weeks the scab falls off, leaving a permanent scar.

The important point in the care of a vaccination vesicle is to keep it from becoming infected. The dressing or shield should be removed daily, after the vesicle is formed, and the whole area washed with alcohol and the sterile dressing reapplied.

If good vaccine is used, and if care and cleanliness are exercised in its use, there will be no serious results from vaccination. If the vaccination does not "take" within ten days the child should be re-vaccinated.

CHAPTER XXX

THE INFECTIOUS DISEASES

The old group of infectious diseases was comparatively small. It has gradually been added to, so that now it includes practically all of the febrile diseases. There is, however, a certain group of infections to which children are peculiarly susceptible which are communicated from one to the other. Most of this group are subject to some degree of quarantine by the different boards of health. The diseases which will be considered in this group are the following: scarlet fever, measles, German measles, diphtheria, whooping-cough, mumps, chicken-pox, smallpox, erysipelas, tuberculosis, syphilis.

Quarantine

Quarantine formerly meant isolation for forty days. It is now a term used to signify isolation for any length of time, and may be partial or complete.

Outside of institutions for the care of contagious diseases, most of the quarantine is partial. The child is isolated so far as possible and the father and other older members of the family are permitted to go to their work.

If a trained nurse is employed, and the arrangement of the rooms is anything like ideal, a fairly efficient quarantine may be maintained.

By a proper working knowledge of the character and habits of the different organisms, and the manner by which they are communicated from one person to another, an efficient quarantine may be maintained in certain diseases without materially interfering with the necessary routine of the household or in keeping the bread-winner from his work.

For example, it has been demonstrated in several contagious hospitals that scarlet fever and diphtheria may be treated in the

same ward, the patients being separated by partitions in the form of stalls, if the attendants exercise the proper care as to cleanliness, without any cross-infection taking place.

Milk as a Source of Infection.—The old idea that the common way for infection to travel was by the air from house to house has been recently disproven. It has, however, been proven that a common source of infection in a neighborhood is the milk-wagon which distributes infected milk, frequently receiving infected empty bottles in return and taking them back to be refilled and redistributed without proper sterilization.

It is improbable that any of the infectious agents are carried any great distance through the air, but are limited to fairly close proximity to the infected persons.

The common means by which disease is spread are the following:

1. Close contact with an infected person.
2. By means of dishes or other utensils used by an infected person.
3. By means of a third person who has come in such close contact with an infected person as to permit the infectious material to adhere to the clothing.
4. By means of infected food or water.
5. Carriers—persons who, although not sick themselves, may harbor infectious organisms.
6. Insects, particularly flies and vermin.
7. Domestic animals—dogs and cats.

Care of Clothing and Utensils.—In caring for a child with a contagious disease, the simplest washable clothing only should be worn. The sleeves of the dress and outer gown or apron should not reach below the elbow. If a nurse has charge of more than one patient, there should be a separate gown for each—unless both have the same disease. Each patient should have his own complete outfit of utensils. The thermometer should be kept in a strong solution of carbolic acid or some other powerful antiseptic, it first having been thoroughly washed. I

have recently found pure culture of streptococci on several clinical thermometers which had been used in the mouth of an erysipelas case, and this after they had been washed in water and then in alcohol.

All dishes should be boiled before being sent to the kitchen. Milk bottles should not be admitted in the sick-room. The milk should preferably be transferred to a sterile covered receptacle and boiled or pasteurized and then placed on the ice until used. If milk bottles are admitted to the house they should always be boiled before returning to the dairy.

Clothing which has come in contact with the patient should be thoroughly carbolized or lysolized in a 2 per cent. solution, or subjected over night to a 1–1000 formalin solution, after which it should be sent to the laundry and boiled. Handkerchiefs are particularly liable to be soiled with infectious material. For this reason it is more practical to use cheese-cloth, which can be burned.

Excreta.—All the excreta from the patient, urine, fæces, and sputum, usually contain infectious material, which should be destroyed by carbolization before being put into the closet.

Care of the Hands.—The hands of the nurse should be washed thoroughly with soap and water each time the patient is handled. The continuous use of strong antiseptics on the hands is liable in the long run to do more harm than good, as this destroys the upper layer of the skin which serves to harbor bacteria.

In the actual handling of erysipelas and scarlet fever where the streptococci are omnipresent, rubber gloves should be worn. They should be sufficiently large as to be slipped on and off without difficulty.

There are certain requisites for rooms in which a patient is to be quarantined.

They should be as far removed from the living-rooms as possible, preferably on the top floor. They should be comfortable, with plenty of windows and direct sunlight. There should

be a bathroom in connection, to be used exclusively by the patient and the nurse. A wood stove is almost indispensable in such a sick-room, even if the rooms are heated by a central heating plant. It acts as an excellent ventilator, infected rags, etc., may be burned, water may be boiled for scalding and washing dishes, bathing, and an endless variety of other things. An open fireplace is an excellent adjunct to any such room but it will not, in a quarantined apartment, take the place of a wood stove.

The time of quarantine is variable and will differ with the disease.

Protection of the Nurse Against Infection.—While in quarantine nurses should take every means to protect themselves against infection. While swabbing the throat of a child infected with diphtheria or scarlet fever, a nurse should always take the precaution to wear a pair of large glasses to protect the eyes, and a mask of gauze, such as surgeons use in operating, over the nose and mouth. If nurses take such precautions they would not so often be themselves victims of these diseases, nor when relieved from quarantine act as carriers to infect others.

It must be remembered that two or more of the contagious diseases may exist in the same patient at the same time. In a considerable proportion of cases diphtheria bacilli are present in the throats of scarlet fever patients and may become active.

In contagious hospitals a certain amount of cross-infection is inevitable unless the most rigid precautions are taken.

Scarlet Fever

Scarlet fever is an acute contagious disease characterized by sudden onset with vomiting, fever and sore throat (angina), and the appearance usually within twenty-four hours of a characteristic rash.

Streptococci[1] are practically always present in the throat and are probably the cause of the angina and enlarged glands, as

[1] A form of streptococcus known as the beta form isolated by Dr. Theobald Smith and others.

well as of the middle-ear and kidney complications which so often occur in the course of this disease. One attack of the disease usually renders the person immune for life.

Incubation.—The period of incubation (that is, the time which elapses after exposure until the first symptoms appear) varies from one to nine days.

Presence of the Streptococcus in the Throat.—The specific organism is still unknown. The fact that the streptococcus is practically always present in the throat has led many observers to believe that this organism may be the specific cause.

Means of Dissemination.—Whatever the specific organism or poison, it is extremely tenacious and has been known to remain in clothing for years and then produce the disease in a susceptible individual. Until recently it has been thought that the disease was chiefly carried by means of the scales during the period of desquamation. Whether the scales in themselves are infectious it is not definitely known. That the discharges from the nose, throat and also the ears, if there is a middle-ear involvement, are extremely infectious there is no doubt It is probable that these are the chief sources of infection.

Quarantine.—The boards of health have kept, and still do keep, scarlet fever cases quarantined until they are through scaling, with the minimum of three weeks. This may or may not be sufficient. If a child has a purulent discharge from the nose or ear, it should not mix with other children as long as the discharge continues. After a child is released from quarantine it is always a wise precaution to keep him from close contact with other members of the family for as long a time as possible. Kissing and the use of the same towels should be especially prohibited.

Course.—There is probably none of the infectious diseases in which the course varies so greatly as in scarlet fever. The child may be intensely sick from the onset, the temperature high, the throat swollen, œdematous and covered with a necrotic membrane, the glands of the neck swollen and tender, and after twenty-four hours there may be an intense rash covering the

entire body. In such a case the poisoning may be so severe that death results within the first few days.

From such an extreme as the above, there are all grades, to that in which it is impossible to say whether the case is really scarlet fever.

In most of the cases, and even the mild ones, there is a characteristic appearance of the tongue—"strawberry tongue." This condition follows the desquamation of the upper layers of epithelium, leaving the surface red and the papillæ prominent. Even when the rash is most intense over the whole body, there is always a relatively pale area around the mouth.

Desquamation.—In the severe cases, the desquamation of the skin begins on the neck and face even before the rash has disappeared from the rest of the body. In such cases the skin of the hands and feet may be exfoliated in the form of casts. This, however, is very unusual. In the milder cases the desquamation of the body may be difficult to detect, and it is only after two or three weeks, when the palms of the hands and soles of the feet begin to "peel," that a positive diagnosis is possible.

It is these mild cases which so frequently serve to spread the disease. They often go unrecognized and are sent to school as usual.

All cases in which there is a sore throat associated with a rash and strawberry tongue should be diagnosed as scarlet fever and isolated, at least for a time.

Complications.—The most common complications in scarlet fever are the following:

1. Infection of the glands of the neck (adenitis). This may be so severe as to break down and form abscesses, which may have to be opened and drained.
2. Abscess of the middle ear, sometimes including the mastoid.
3. Acute nephritis.
4. Acute pericarditis and endocarditis.
5. Multiple arthritis.

Care of the Nose and Throat.—With severe infections of the throat and nose, some mild non-irritating antiseptic, such as argyrol (10 to 20 per cent. solution), may be frequently dropped in the nose, with the head well back, so that it will run into the throat. If there is much purulent discharge the nose and throat should be irrigated with normal salt solution by tipping the head well forward and allowing the solution to go in one nostril and out of the other. The mouth and teeth should be kept scrupulously clean with some mild antiseptic solution, such as Seiler's or Dobell's.

Under no circumstances should fluid be introduced into the nose under pressure, on account of the danger of forcing infectious material into the middle ear.

An ice-bag should be kept fairly constantly applied over the enlarged glands in the neck, and if they break down they should later be opened.

The Urine.—The urine in scarlet fever should be sent regularly to the physician for examination and the daily quantity measured.

When there is any heart involvement, absolute rest in bed should be insisted upon. If all cases of scarlet fever, even mild cases, were kept in bed for two or three weeks, there would be less permanent disability of the heart and kidneys.

Diet.—During the acute period of the disease the food should be extremely light, consisting chiefly of boiled milk diluted with water, or, better, buttermilk and carbohydrates. During this time copious draughts of water should be given; weak lemonade or orangeade is an excellent substitute.

The bowels should be kept open daily, if necessary with a simple enema, and when the desquamation begins the skin should be anointed daily with oil.

Measles

Measles is the most common of the eruptive fevers. It is highly contagious and occurs in such wide-spread epidemics that

it is rare that a child, in the city at least, reaches the age of adolescence without having had the disease.

The specific cause of measles is unknown, but the infectious poison is given off in the breath and is spread further by means of the air than almost any of the other forms. The poison, however, is soon destroyed and "does not persistently cling to clothing and dwelling rooms, as does scarlet fever."

Initial Symptoms.—Measles has an incubation period of from 12 to 14 days. Then begin the initial symptoms, lasting from three to five days, during which time the child has slight fever, gradually increasing, with beginning cough, sneezing and redness of the conjunctivæ.

The Rash.—At the end of the initial period the cough is usually dry and persistent, the eyes red and sensitive to light, and a characteristic blotchy rash appears, first on the face and neck, gradually spreading to the body and extremities. In a large percentage of the cases, as long as two or three days before the rash appears on the skin, there may be evidence of the disease on the mucous membranes of the mouth in the form of tiny white flecks on a red base, known as "Koplik's spots." The rash persists for from four to six days, gradually disappearing in the order in which it came.

Contagious Character.—The disease is contagious from the onset of the catarrhal symptoms, a fact which makes a successful quarantine difficult if not impossible in many cases. Few, if any, children are naturally immune, although very young infants during the first year do not acquire it so readily.

Temperature.—During the period in which the rash is coming out, the temperature is usually the highest, often reaching 104° F. on the second day of the eruption. When the rash is fully out, the temperature begins to recede and the cough usually becomes less troublesome. During this time the eyelids may be stuck together with secretion. This may be prevented by smearing the margins of the lids with vaseline. There is also a marked burning and itching of the skin during the first 24 to 36 hours of the eruptive stage.

The eyes should be bathed frequently with a warm boric acid solution and the bright light excluded. Dark glasses may have to be worn for some weeks subsequently, on account of the sensibility to light.

For the intense itching of the skin, an olive oil rub will usually lessen the irritation.

In uncomplicated cases the child is usually fully convalescent within a week from the first appearance of the rash.

Complications.—The complication most to be dreaded in measles is bronchopneumonia. It is particularly liable to attack poorly-nourished children. In institutions for children measles must therefore be regarded as a serious disease. When a cough persists for a long time following measles, tuberculosis must always be kept in mind and the patient thoroughly examined by a physician. Another complication rather common in measles is otitis media. The heart should be examined frequently, for, although affections of the heart are not so common in measles as in some of the other diseases, they are by no means rare.

Children suffering from measles should be kept in bed until the rash has disappeared, and they should not be allowed to go out of doors in winter until the cough has ceased.

During the entire illness an abundance of fresh air, warmed to a temperature of 65° to 70° F., should be furnished. The air should be kept moist by a steam kettle. It will be found that inhalations of steam, to which some tincture of benzoin (3i–1 pint water) has been added, will do much to modify the laryngeal irritation in these cases.

Quarantine.—According to Holt, the average infectious period of measles is three weeks. This is a much longer period than the average child is quarantined. This, together with the fact that most cases are not isolated during the initial stage of the disease, probably accounts for its wide-spread epidemic character.

Slight desquamation sometimes occurs after measles. This rarely, if ever, involves the soles of the feet or the palms of the hands.

German Measles—Rubella

Rubella is an acute contagious disease occurring almost always in epidemics, although it is not nearly so contagious as scarlet fever or measles. The incubation period varies from 10 to 21 days. The prodromal symptoms are usually slight and of short duration and consist of fever and general malaise. Occasionally the disease is ushered in by a convulsion and high fever. The eruption, which is somewhat variable, usually resembles measles. It appears first on the face and spreads rapidly to the body and extremities. The coryza, laryngitis, photophobia and Koplik's spots of measles, however, are absent. The most constant symptom is swelling of the postcervical glands, and particularly those behind the ear over the mastoid. There may be a mild sore throat. By the time the rash is fully out the temperature has usually disappeared. The rash fades rapidly and the patient, after a day or two, is apparently as well as ever. There is usually slight desquamation of tiny scales scattered over the entire body. If the case is not seen until the scaling has begun it may be mistaken for a mild case of scarlet fever.

The treatment is purely symptomatic. The food should be light and the bowels kept open, if necessary, with a simple laxative. There are rarely any serious complications.

Varicella—Chicken-pox

Chicken-pox is an acute contagious disease characterized by an eruption on the skin of papules and later vesicles which are typical in appearance, and by mild constitutional symptoms. The specific poison is not known, but it is conceded to be very contagious, rivalling measles in this respect. The contagious element is contained in the vesicles, and probably also in the breath.

Incubation Period.—The incubation period is from 14 to 16 days. The appearance of the eruption may be preceded by a short period of malaise and slight fever. In many cases the eruption is the first evidence of the disease. The number and distribution of the vesicles is extremely variable. There may

not be over a dozen or so on the entire body, or the eruption may be so closely crowded as to be confluent.

The vesicles occur in successive crops extending over a period of several days, the first ones often forming crusts before new ones appear. The vesicles may occur also on the scalp and on the mucous membrane of the mouth and tongue. In one case I saw a pock on the inside of the eyelid.

In mild cases there are few symptoms of any moment, but in severe confluent cases there may be severe poisoning from a pus infection of the skin.

For the intense itching carbolized vaseline usually gives marked relief.

Pitting.—Scratching should be prohibited because of the danger of infection and also because the pitting will be much exaggerated if the scab is constantly removed.

The child should be isolated until the crusts have fallen off. The urine should be examined, as nephritis is an occasional complication.

Smallpox—Variola

Smallpox is an acute, highly infectious disease. It occurs in epidemics where the public is not protected by vaccination.

It is contracted usually by coming in close proximity with some one suffering from the disease although it may readily be carried by soiled clothing, utensils, or by a third person.

Before vaccination was introduced by Jenner, in England, about the year 1774, small-pox was epidemic annually during certain seasons of the year, especially during the cold weather.

No age is exempt and there are many authentic cases recorded in which the fœtus suffered from smallpox *in utero*. Such cases have been known to recover without the mother miscarrying, and at birth the baby showed the pock-marks typical of the disease. One attack gives immunity for life.

Results of Vaccination.—Much of the smallpox seen now is mild and very atypical as a result of previous vaccination.

In typical cases the onset is sudden. There is usually a

severe chill or convulsion, severe headache, and often an intense pain in the lumbar region. The temperature during the first day may reach 104° F., or higher. There is frequently great restlessness and delirium. The tongue is coated and the breath foul.

Eruption.—The eruption usually appears on the third day, but may be delayed until the fourth or fifth. It appears first on the face and wrists and then spreads over the entire body, with certain characteristic groupings. The eruption appears first as a papule, which gradually, within a few days, becomes shotty to the touch. Within 24 hours these papules are changed to vesicles, and are gradually transformed into pustules. The vesicles, or pustules, are surrounded by an intensely red area, as is also the vesicle of chicken-pox. The pustules gradually dry and form crusts. In severe cases, where the pocks are crowded closely together, they become confluent, so that later the crusts may be practically continuous. A hemorrhagic form of smallpox is also described, which is particularly fatal.

Complications.—The chief complications of smallpox are due to the general septic condition resulting from the pus infection. There is no organ in the whole body which may not be affected by the disease.

The average course, fortunately, in cases which have been successfully vaccinated, is rather mild.

Vaccination After Exposure.—When a child has been exposed to smallpox it should be vaccinated at once, as there is usually time for the vaccine to "take" before onset of the smallpox.

The general treatment is symptomatic and will vary with the individual case.

Mumps—Epidemic Parotitis

Mumps is an acute infectious disease characterized by slight prodromal symptoms and swelling of one or both parotid glands, with a tendency to affect the testicles in males and the ovaries in females. The submaxillary glands may at times be involved.

One or both parotids may be affected. The disease is contagious, but not highly so, it being conveyed from one to another by the breath or by utensils, such as towels, dishes, etc. The incubation period is from 14 to 21 days. The appearance of one suffering from mumps is typical. The gland which is located in front and below the ear is swollen, the swelling reaching its height about the third day. The ear seems to stand out from the head. The skin is shiny in appearance and "doughy to the feel." The gland does not break down, as in most other infections.

After a few days the swelling gradually subsides and the gland returns to its normal size.

During the acute stages there is usually some fever, 101° to 103° F. There is usually considerable pain and discomfort, especially when an attempt is made to open the mouth. One attack, if both sides are involved, usually renders the patient immune for life. If only one side is involved, a subsequent attack may involve the other gland.

Orchitis.—"Orchitis is met with not infrequently, especially in boys approaching the age of puberty," and, according to one authority, occurs in about 16 per cent. of males of all ages. It may occur several weeks after the parotitis.

The testis becomes swollen and tender and there are usually marked constitutional symptoms.

Involvement of the Ovaries.—In girls the vulva and ovaries may be affected. In severe cases the inflammation is followed by an atrophy and destruction of the function of the gland.

Treatment.—The patient should be kept in bed until some days after the inflammation of the parotid has subsided. The nourishment will usually have to be of liquid consistency and may be taken by older children through a glass tube or straw. In young children with double parotitis it may be necessary to feed them through a tube passed through the nose.

The pain in the gland may be relieved by hot fomentations.

Where orchitis or ovaritis occurs the patient should be kept constantly in bed and ice or hot applications applied to the affected gland. These measures should only be taken under the advice of a physician.

The patient is probably capable of infecting others for several weeks from the onset of the disease.

Pertussis—Whooping-cough

Whooping-cough is a specific contagious disease characterized by catarrhal congestion of the upper respiratory passages and a paroxysmal cough ending in a long-drawn inspiration or "whoop."

Fatality in Young Infants.—In young infants pertussis is a very fatal disease, and even in older children it is not a condition to be regarded too lightly. It occurs in epidemics and is transmitted from one person to the other by means of the breath, or more probably by the saliva which is thrown from the mouth and throat during a paroxysm of coughing. Czerny, in a recent communication, says that in his experience whooping-cough is not as infectious as is generally supposed. When a child with whooping-cough was accidentally admitted to a ward and kept in bed at a distance of 1½ metres (about five feet) from the adjoining beds, the other children did not contract the disease. The incubation period is probably about 14 days.

The onset is gradual, and for the first week or two there may be nothing more than a cough, which, however, comes on periodically. The child wakes out of a sound sleep and has a fit of coughing and then goes to sleep again. The secretion which comes from the throat during this time is of a clear viscid character. Gradually the paroxysms become more severe, and in typical cases the face becomes intensely red and sometimes cyanosed, the eyes prominent, and the conjunctiva injected, and the pupils dilated. At the end of the successive expiratory coughs comes the "whoop" with inspiration. This may be repeated several times, until the child is completely exhausted. The child

knows when an attack is coming and runs to the mother or nurse for support. Convulsions are a frequent and extremely dangerous complication in young infants.

Vomiting.—During the attack, if the stomach contains food it is liable to be expelled by vomiting. In many cases the vomiting is so persistent that the child soon begins to show the result of starvation.

In these cases concentrated liquid food should be given and in small quantities, rather often, with the idea of having the stomach empty itself quickly. Where the vomiting is persistent an adhesive strip, two to three inches wide, drawn tightly over the lower part of the thorax at the level of the diaphragm, will do much to prevent the regurgitation of food.

Spasmodic Stage.—The spasmodic stage lasts for a variable period of from three weeks to three or four months. If the disease occurs in winter it is liable to be especially long drawn out, and with every little "cold" the whooping begins again. The severest period usually lasts about three weeks. In mild cases there may be no real whooping, and there may be doubt as to the diagnosis. The paroxysmal character of the cough, particularly the waking out of a sound sleep with a paroxysm, is always suspicious.

Treatment.—The treatment consists largely in keeping up the patient's vitality. There are no specifics. In good weather, even in winter, the children, if rugged, should be kept out of doors as much as possible. In New York City children with whooping-cough who play out of doors are required to wear a band across the arm or chest with the word "whooping-cough" printed thereon. For young infants the air should be kept fresh, moist, and of a uniform temperature. Most of the cures which are recommended by the laity are really harmful and should not be used.

The chief complications to be dreaded are pneumonia and acute dilatation of the heart.

When the paroxysms are particularly severe there may be temporary paralysis of some of the muscles resulting from minute hemorrhages in the brain or from the accumulation of fluid. Bleeding from the nose is common, and there may be hemorrhages into the conjunctivæ or into the tissues in and around the orbits.

Diphtheria

Diphtheria is an acute infectious disease due to the Klebs-Löffler bacillus (diphtheria bacillus). The disease usually begins in the upper air passages, on the tonsils, in the nose or in the larynx, and is characterized by the formation of a false membrane which is more or less typical in appearance. The diagnosis is made definitely by a culture and a microscopic examination. There is no other way of positively differentiating diphtheria from some of the forms of inflammation in which a membrane is present.

Diphtheritic membrane occurring in the eyes and vulva is rare and is usually due to secondary infection.

Diphtheria Toxins.—The growth of the diphtheria bacillus in the throat or nose produces toxins which are absorbed into the general circulation, producing the serious symptoms which so often develop in diphtheria.

Means of Dissemination.—The disease is readily communicated from one to another by reasonably close contact, and is often spread by carriers, as well as by milk and other indirect means. In a recent epidemic in St. Paul over 200 cases of diphtheria developed from one dairy. Upon examination by the department of health two men who were employed in milking the cows were found to be suffering from a mild attack of diphtheria.

Incubation Period.—The incubation period is variable, but is usually short, varying from one to four days.

The onset is usually sudden, beginning often with vomiting and sore throat. There is some elevation of temperature and the pulse is usually much increased in frequency.

Appearance of Throat.—If the throat is examined during the first few hours there may usually be seen a patch of membrane on one or both tonsils. This is usually of a grayish-white color, but may be white. It rapidly spreads and in a few hours may cover the tonsils, and within 24 or 36 hours the pillars of the soft palate and uvula. There is usually some swelling of the cervical lymph-glands, and in severe cases there is considerable œdema. Swallowing is usually somewhat painful. If the disease begins in the nose it may be overlooked, and some time may elapse and severe general symptoms develop before a diagnosis is made.

Nasal Diphtheria.—There is often an excoriation of the skin about the nostrils, sometimes extending well down on the lip. Whenever such an excoriation is seen, a culture should be made and the child isolated until a report is received from the health department. Some years ago such a case was admitted to one of my wards and was not recognized until many other children had developed diphtheria. A one-sided nasal discharge of a serous character will usually be found to be diphtheria.

Laryngeal diphtheria frequently extends from the pharynx, but may develop primarily.

Membranous croup was formerly thought to be an independent disease, but is now known to be *laryngeal diphtheria.*

Membranous croup and spasmodic croup are still often confused in the public mind. When a spasmodic croup persists for more than a few hours after the ordinary remedies, such as ipecac and the steam tent, have been tried, a physician should always be sent for and a critical examination made and a culture from the larynx taken. The patient thereafter should be carefully watched, as intubation may be necessary.

The general symptoms of diphtheria are those of a general toxæmia, the most serious effects of which are evident in the heart and nervous system.

Heart Involvement.—The toxins act both on the heart

muscle, producing a degeneration, and upon the nerves controlling the heart and blood-pressure, as well as upon the motor nerves.

The pulse is usually rapid at first, but in favorable cases gradually returns to normal. In severe cases the pulse is rapid and of low tension, or later slow and irregular, frequently missing every second or third beat.

The heart is frequently dilated, the apex beat extending often considerably to the left of the nipple line. These irregularities of the heart may come on several weeks after the patient is apparently convalescent.

Paralysis of certain muscles or groups of muscles is common following diphtheria. Strabismus is common, due to paralysis of the recti muscles. Paralysis of the throat muscles is common, manifested usually by an inability to swallow liquids, the food regurgitating through the nose. Great care and careful nursing are required in these cases to see that the patient gets sufficient food to maintain the general nutrition. It may be necessary to feed him for a time by means of a tube, introduced into the stomach by way of the nose.

Paralysis.—*This paralysis is due to the toxin of the diphtheria and not to the antitoxin, as is frequently believed by the laity. In the pre-antitoxin days postdiphtheritic paralysis was much more common than it is to-day.*

Treatment.—Antitoxin is a specific for diphtheria, and when given early enough and in sufficient doses the death rate is very small. Before 1896, when antitoxin began to come into general use, the mortality from diphtheria varied from 20 to 35 per cent. Since antitoxin has been used as a routine, the death rate in the St. Paul City and County Hospital has not been over 6.5 per cent., and that in a hospital where usually the worst cases are sent for treatment.

If every case in which there is a membrane in the throat were regarded with suspicion and a culture made at once, the death rate from diphtheria would be still much lower than it is to-day.

Antitoxin.—The antitoxin is usually given subcutaneously between the shoulders, or in the loose subcutaneous tissue of the abdomen. It may be given intramuscularly or intravenously. The skin should be well cleansed with soap and water and then with alcohol, or some tincture of iodine may be painted over the area where the injection is to be given. The area where the injection is made should not be rubbed or massaged to promote the absorption of the serum, as an abscess may result. Several injections may be given on successive days, as determined by the symptoms.

When sufficient antitoxin is given at the initial dose, and early enough, there is usually an amelioration of the symptoms after 24 to 36 hours. The temperature falls, the swelling of the glands of the neck gradually subsides, and the membrane in the throat begins to loosen around the edges. In favorable cases after two or three days the membrane has disappeared, and the patient is convalescent. It is often at this time that the heart complications begin to appear.

All cases of diphtheria should be kept in the recumbent position for at least three weeks, and this rule should be departed from only by the consent of the physician. The sudden deaths from heart paralysis usually result from sitting up suddenly and often when the patient feels perfectly well. When the pulse, following a severe diphtheria, drops down as low as 35 to 40 beats per minute, and especially if irregular, it usually means a serious heart affection. The child should not be allowed to move from the horizontal position under any consideration. The time during which a patient must remain in the recumbent position will depend entirely upon the heart findings, but it should be much longer than is generally deemed necessary. It will usually be necessary to put young children in a restraining sheet to keep them from sitting up.

General Care and Feeding.—The general care and feeding of these cases is of the greatest importance. The food should be simple, but nutritious, and the bowels kept open with simple

enemas. Some general massage will be necessary to keep the skin from showing the effects of pressure in the cases which must remain long in the recumbent position. An air cushion or two will often be indispensable.

LARYNGEAL DIPHTHERIA

When there is a marked obstruction from membrane in the larynx, so that the suprasternal notch is markedly retracted with each inspiration, intubation or tracheotomy should be performed. Intubation with an O'Dwyer tube (Fig. 117) is the simplest

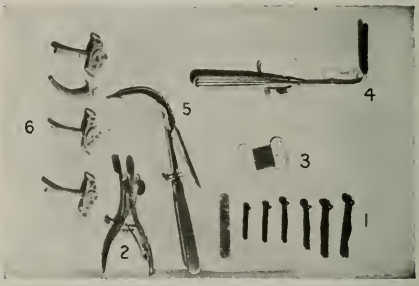

FIG. 117.—Instruments for intubation and tracheotomy. 1, O'Dwyer tubes; 2, mouth gag; 3, silk; 4, obturator for introducing tube; 5, retractor for removing tube; 6, tracheotomy tubes.

operation, and the physician, unless there is some contraindication, will usually prefer it. Both the intubation and tracheotomy instruments should, however, be ready for the physician when he arrives, as usually no time is to be lost.

The proper tubes according to the age of the child should be selected and threaded with silk, and all of the instruments sterilized.

INTUBATION.—The child should be rolled in a sheet, with the hands by the sides and the sheet pinned firmly with safety-pins. A small roll should be provided for the back of the neck. The tube is introduced while the child is in the horizontal posi-

tion (Fig. 118). The string may be left in and plastered to the side of the cheek by means of an adhesive strip. In this case the hands should be restrained, or the child will pull out the tube. After 24 hours it is often removed. If any obstruction occurs in the tube it may be removed by making traction on the string.

Tracheotomy.—When tracheotomy is done a tube is introduced into the opening and held in place by braid tied around the neck. One tube which fits within the other is removed at intervals, and the secretion removed, and then reintroduced.

Fig. 118.—Position of child for intubation. (St. Paul City and County Hospital.)

In both cases the children will be kept in a steam tent for several days (Fig. 119). In the use of the steam tent care must be taken to insure the patient a proper amount of fresh air. An aperture above and below sufficient for proper circulation of air should always be maintained.

Feeding.—The feeding of intubation cases is at first difficult. The head should be lowered and only liquid diet given, which is done slowly, with a spoon. These cases soon learn how to use the base of the tongue to protect the opening in the tube, so that after the first day there is little difficulty.

Removal of Tube.—The tube is left in usually for a few days, and then removed. It is not unusual that a sudden attack of dyspnœa necessitates its immediate reintroduction, so that before a tube is removed all necessary instruments should be at hand. It must be remembered that intubation and tracheotomy are only measures to relieve the obstruction, and that the cure for the condition is antitoxin in early and sufficient doses.

Quarantine is usually maintained until two successive negative cultures from the throat and one from the nose (both sides) are

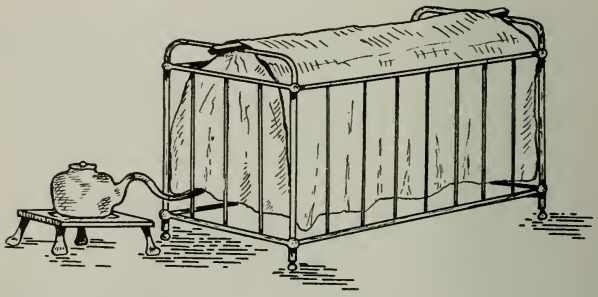

Fig. 119.—Steam tent.

obtained. Many means have been recommended for hastening the disappearance of the bacilli from the throat, but none of them have been very successful. The mildest ones are often the ones in which the bacilli persist the longest.

Typhoid Fever

Typhoid fever is an acute infectious disease due to the typhoid bacillus. It is not common in infants under two years, but undoubtedly occurs more often than is generally supposed. Typhoid may infect a child *in utero,* the bacilli passing directly from the mother's blood to that of the fœtus (Morse).

During childhood the disease is common and its course does not differ essentially from that occurring in adults.

Lesions in the Bowel.—The lesions are primarily in the Peyer's glands, producing ulceration and occasionally intestinal hemorrhage and perforation.

Sources of Infection.—Milk, of course, is a common source of infection, well-water which has been contaminated by drainings from out-houses being the original source of infection in the majority of cases.

Infants with typhoid fever are frequently sources of infection to other members of the family. In changing the diaper the mother's hands usually become soiled, and, unless she is scrupulously clean, she may readily infect herself and others through the food. The fever is continuous, with morning and evening remissions. There is usually some diarrhœa, often of the "pea-soup" variety. The spleen is enlarged and can be palpated in more than half the cases, and there are usually successive crops of rose-spots scattered over the abdomen, and sometimes over the entire body. After the end of the first, or beginning of the second, week, the Widal reaction will usually be positive, although in children it may be negative until convalescence is established, and then become positive.

The nursing of typhoid is the essential thing in the way of treatment.

Diet.—The diet is of the greatest importance. Uncooked whole milk is a poor diet for typhoid, either in children or adults. The milk should be skimmed and boiled and well diluted with cereal gruels and sugar, to increase the caloric value, as well as to modify the intestinal flora.

Buttermilk.—Buttermilk, to which flour and sugar have been added, is an ideal diet for typhoid in children; the tongue remains moist and the abdomen is little, if at all, distended, and the stools lack the evidence of putrefactive changes which is present when the diet consists of whole milk (unsoured). It is quite possible by giving large amounts of cereal gruels with

sugar and a proper amount of proteid to have children run a course of several weeks and lose little, if any, in weight.

Baths.—Children should rarely have cold baths. Cool sponging will usually be all that is necessary. The indications for cold sponging are restlessness, high fever, and delirium.

Care of Mouth and Teeth.—The mouth should receive special care in typhoid. The teeth and tongue should be kept free from hardened secretions, as serious secondary infections may result. For this an alkaline solution such as Seiler's should be used.

Bed-sores.—Great care must be taken in these cases that bed-sores do not develop. When there is any evidence of pressure, as shown by redness of the skin, an air cushion should be provided at once. After the skin is once broken it is difficult to heal and secondary mixed infections are particularly liable to occur in these cases.

Bowels.—When the bowels are constipated physic should not be given, but the lower bowel should be emptied daily with a simple enema of normal salt solution.

Vaccination.—During the past few years vaccination has been successfully practised as a preventive measure against typhoid fever. The vaccine consists of a solution of the dead typhoid bacilli which are introduced into the skin by means of a hypodermic syringe. Since routine vaccination has been practised in the United States Army, very few cases of typhoid fever have developed among the soldiers stationed in the tropics where formerly large numbers were infected. If children are to be subjected to conditions where the milk and water supply are uncertain, as might occur in travelling or during an epidemic, they should be vaccinated against typhoid, unless there is some definite contraindication.

Tuberculosis

Tuberculosis is an infectious disease produced by the tubercle bacillus. There are at least three varieties of the tubercle bacillus:

human, bovine, and avian, the last form producing so little trouble in human beings that it will not be considered here.

It has been proved that bovine tuberculosis may infect human beings, although for many years Koch taught the contrary.

FIG. 120.—Tuberculous disease of the vertebræ. (Pott's disease).

Tuberculosis may be local or general. Almost any organ or portion of the body may be the seat of a tuberculous infection (Fig. 120).

MEANS OF INFECTION.—Tubercle bacilli may be inhaled with

the air and directly infect the upper air passages or the lungs. The bacilli may be taken up by the tonsils or other lymph-glands in the throat and be carried to the lymphatics in the neck, or the bacilli may find entrance to the blood stream and be disseminated throughout the body, producing general miliary tuberculosis.

Cows and Milk.—Cows are particularly liable to tuberculosis. It is estimated in England that about 10 per cent. of the milk contains tubercle bacilli, and the percentage is probably not less in this country. Since milk is frequently given uncooked to children, it is probable that a considerable number are infected in this way.

Inheritance.—It was formerly thought that children frequently inherited tuberculosis. This is extremely rare, if it ever occurs. Children do inherit a weakened constitution and a poor physique, which often makes them easy victims, and when infected they have little resistance. The fact that so often several members of a family die one after another with tuberculosis has served more than anything else to show the contagious character of the disease.

Personal Habits of Tuberculosis Patients.—Persons suffering from pulmonary tuberculosis, unless closely watched, are prone to be very careless about destroying the sputum. In coughing there is a constant spray of infected sputum disseminated about the room. The result is that infection of other members of the family is common.

Meningitis.—Tuberculous meningitis is common in children, as is also tuberculous infection of the bones and joints, and in many cases it is difficult or impossible to trace the source of the infection.

In the wasting diseases of infancy tuberculous infections of the mediastinal or mesenteric glands are more common than is generally suspected. Enlargement of the mediastinal glands often produces a cough resembling whooping-cough; an X-ray will often show the shadow of the enlarged glands.

Peritonitis.—Tuberculous peritonitis is rather common in children after the second or third year. There may be a large accumulation of fluid in the peritoneal cavity, or there may be no fluid but the omentum becomes involved, forming masses which can be felt through the abdominal wall.

Nursing in Tuberculosis.—A tuberculous mother should not nurse her baby; neither should she have the care of it if she has active tuberculosis, with tubercle bacilli in the sputum.

Children should never be taken where there is a patient with pulmonary tuberculosis. After a patient with pulmonary tuberculosis has been removed from a house the entire house should be renovated and repapered or painted, before it is occupied again.

Treatment.—The treatment for tuberculosis in children is practically the same as for adults. Fresh air and a diet as high in fat as can be assimilated. Sleeping out of doors in screened tents or houses should be encouraged. Even the school should be out of doors (Figs. 22 and 66).

Diet.—Cod-liver oil will often be tolerated by young children when the cream of cow's milk will not be. One must be careful not to crowd the diet sufficiently to upset the digestion, otherwise more harm than good will result.

Involvement of the Joints.—Children with beginning tuberculosis of the hip-joint are usually restless at night, cry out in their sleep, complain of pain about the knee, and limp when walking. When lying down they usually have the leg flexed. There is liable to be a daily rise of temperature. The nurse should recognize these symptoms and have the child examined by a physician early, before any serious changes have taken place in or about the joint.

Syphilis

Syphilis is a chronic infectious disease produced by an organism which belongs to a higher class than the bacteria—the *Spirochæte pallida*.

The disease may be inherited or acquired. It is readily acquired through an open wound in the skin or through the mucous membranes, by contact with syphilitic secretion. The local lesion in acquired syphilis takes about a month to develop and forms what is generally known as a *chancre*. After several weeks a general infection occurs, as evidenced by the appearance of a characteristic rash.

Children born of syphilitic parents are likely to inherit the disease.

Many syphilitic mothers miscarry repeatedly. A premature syphilitic infant rarely lives any length of time.

Fig. 121.—Syphilitic eruption on the soles of the feet of new-born infants.

Infants born with syphilis at full term, if the disease is not too severe, may, if they can nurse the mother and have anti-syphilitic treatment, recover from the disease and develop normally.

Snuffles.—When an infant develops "snuffles" within the first few weeks and continues to have a discharge from the nose, and if in addition there is a rash on the skin, especially on the soles of the feet and palms of the hands, or sores about the lips and anus, syphilis should always be suspected and the physician's attention be called to the condition (Fig. 121).

Dactylitis.—Many of these cases have spindle-shaped en-

largements of the shafts of the bones of some of the fingers or toes (Fig. 122). This is known as syphilitic dactylitis. It is significant, but not pathognomonic, of syphilis, as it may also occur in tuberculosis.

THE TEETH.—The teeth are often badly formed in syphilitic children, but if the child has come under treatment they may be normal. Syphilis which has gone untreated may later cause

FIG. 122.—Syphilitic dactylitis.

serious brain lesions or extensive ulcers in almost any portion of the body (Fig. 31).

TREATMENT.—The treatment for syphilis consists of mercury in some form which may be given hypodermically, by mouth, or by inunction. In later stages it is frequently combined with iodide of potassium. During the past few years *salvarsan* or *neosalvarsan,* which is usually injected into the veins, has come into quite general use. It is, however, usually supplemented by mercury in some form.

The treatment for syphilis should extend over a period of three years, and no person who has been infected should marry

until two years after the last symptoms have disappeared. During this time repeated negative Wassermanns should be obtained.

During the acute stage, when there are open sores or ulcers on the mucous membranes, the disease is highly contagious. A syphilitic baby should never be allowed to nurse a wet nurse, as she will almost surely contract the disease. Syphilitic infants should be kept on the breast, as their chances for recovery are comparatively small if fed on artificial food.

If the mother cannot nurse the baby, breast milk should be obtained and fed through a nipple.

If any suspicious signs of syphilis exist in either parent, the child should be carefully watched for many years, as late manifestations are not uncommon.

In later childhood lesions of the eyes and ears due to inherited syphilis are frequent.

Erysipelas

"Erysipelas is an acute infectious disease due to the *Streptococcus pyogenes.*" The inflammation is usually limited to the lymphatic spaces in the skin. The infected area is intensely red, with a well-defined, somewhat raised border separating it from the healthy skin. There may be small hemorrhages into the affected skin, or there may be small vesicles filled with serum raised above the surface. The infection usually begins at some point and spreads rapidly.

In new-born infants the umbilicus is a common seat of infection, which spreads rapidly over the abdomen and may involve much of the skin of the trunk and limbs. I have seen several cases in which the infection began around the anus and one in which it began on the penis after circumcision. These cases are not so fatal as those which have their origin in the umbilicus. Umbilical infections may result in abscess in the liver or in a general peritonitis.

The most common seat of erysipelas in older children is the face. The infection usually begins about the nose or mouth

and rapidly spreads over the entire face, and often the neck, including the ears. It may, however, not invade the scalp, but may limit itself to the hair line.

The course of erysipelas in children is usually severe, the temperature is high, and there are evidences of great prostration. Involvement of the kidneys is common. All cases of erysipelas should be isolated, and under no circumstances should a parturient or pregnant woman come in direct or indirect contact with the disease. No nurse should go from the care of such a patient to a case of confinement.

The treatment consists in application of local antiseptics, with the idea of limiting the infection. "When the disease begins on one of the limbs it may sometimes be headed off by injecting some antiseptic into the skin in front of the infection."

The attendant should exercise every care to prevent infection of herself through small cuts or hangnails.

CHAPTER XXXI

HABITS

THERE are certain habits which infants and children acquire which, if they become fixed, are capable of serious injury to the individual. The sucking of the fingers when hungry is with children a perfectly natural one, but ordinarily it is not persisted in and is discontinued spontaneously.

SUCKING

Thumb or finger sucking is a rather common habit, and if persisted in may result in deforming both the thumb, fingers and the alveolar process, producing irregularities of the teeth.

Some children will suck the skin of their arm or a part of the bed-clothes, or it may be a pacifier. Pains should be taken to break children from such habits before they become fixed. Thumb-sucking may readily be prevented by applying splints so that the child cannot bend its arms at the elbows.

MASTURBATION

Masturbation is rather common to both sexes, even in infancy. It consists in irritating the genital organs with the hands, in rubbing the thighs together, or by rubbing against some object, such as a chair or a hobbyhorse.

The condition may first have its origin in some irritation about the genitals, causing the child to scratch or rub itself. When it discovers the rubbing is accompanied by a pleasurable sensation it continues and forms the habit.

The habit is often acquired in older children from others who practise it, or, not infrequently, from a vicious nurse.

All queer tricks, even in an infant, which are repeated and accompanied by flushing of the face, should be viewed with suspicion.

If the hands are used to produce the irritation they should be restrained, especially in bed. If the irritation is produced by

rubbing the thighs together, an apparatus made of a piece of padded wood, a few inches long, strapped between the thighs, thereby keeping them apart, will usually cure the condition.

The habit of fussing with the foreskin in boys is unnecessary, and too often calls their attention to the genital organs. Simple cleanliness is all that is necessary, and if to accomplish this it is necessary to do a circumcision it should be done at once.

When going to sleep and after waking in the morning, children should be carefully watched. There should always be some plaything at hand to take their attention, for children when awake must be busy. Children when playing together should always be under supervision, without their knowing that they are being watched. In every neighborhood there is always some child who will think it his or her duty to inform the others of the "clever things he has learned." Eternal vigilance is the secret of keeping children in the straight and narrow path. As soon as children are old enough to understand, they should be told not to handle themselves, and given the reason why. Children should feel that they can talk over all matters freely with their parents or the nurse. That much harm in the way of reduced vitality and self-restraint may result from masturbation there can be no doubt. If feeble-minded children acquire the habit it is apt to persist through life. They are not feeble-minded because they masturbate, but they masturbate because they are feeble-minded.

The habit is a vicious one, and every precaution should be taken to prevent its formation, as, like every other vice, it weakens the character and normal functions of the individual.

Sex Hygiene.—The question of how much to tell children about sex hygiene is still an open one. Nurses doing child-welfare work may find opportunity to give much valuable advice, always under medical direction.

In private practice a nurse is not expected to give unsolicited advice about such subjects. If, however, she feels that information should be given, she should first consult with the parents and the physician.

CALORIC VALUES OF SIMPLE ARTICLES OF FOOD

	Calories
1 quart whole milk	670
1 quart skimmed milk	350
1 quart buttermilk	350
1 pint skimmed cream	860
1 ounce bread—1 slice 3 x 4 inches, ½ inch thick	100
1 slice toast, same size	100
2 slices zwieback, 1 ounce	100
3 soda or graham crackers, 1 ounce	100
Cooked cereals, oatmeal, cream of wheat, rice, mashed potato, macaroni, 2 tablespoons	60
Cane sugar, 3 tablespoons—1 ounce	120
Loaf sugar, 3 large dominoes or 6 small ones—1 ounce	120
Green vegetables, cooked and mashed—peas, beans, carrots, spinach—1 heaping tablespoon	30
When butter is added the caloric value is correspondingly higher.	
Butter, ½ ounce—a 1-inch cube	130
Raw lean beefsteak, 1 ounce	28
Raw fat beef, 1 ounce	108
Raw veal steak, 1 ounce	24
Roast pork, 1 ounce	69
Boiled ham, 1 ounce	146
Fried bacon, 1 ounce	249
Baked chicken, 1 ounce	60
Shell-fish, 1 ounce	34
One egg, 1½ ounces	76
Cream (thick), 1 ounce	87
Cheese (Swiss), 1 ounce	135
Dried peas, 1 ounce	108
Rice (dried), 1 ounce	117
Vegetable puree, 1 ounce	53
Meat soup (broth), 1 ounce	7

For diets, the nurse is referred to a standard work on Dietetics, Friedenwald and Ruhräh, or a good cook-book, such as Mrs. Lincoln's or Mrs. Farmer's.

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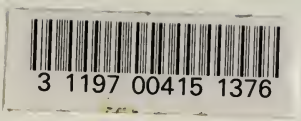
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